

# Analysis of the Company's Bankruptcy Rate using the Altman Z-Score and Grover Methods on Agricultural Companies Listed on the Indonesia Sharia Stock Index in 2019-2021

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## Abstract

The Covid-19 pandemic hit global stock markets, including Indonesia. As a result, all sectoral indexes experienced a decline in their financial performance, especially the agricultural sector in the Indonesian Sharia Stock Index. This study used quantitative research. The population was obtained from 17 agricultural sector industrial companies registered with ISSI with a sample of 12 companies. The result of this study is that there are differences in score results in each bankruptcy prediction analysis method for 3 periods. The Altman Z-Score method in 2019 predicts 8 companies will be declared bankrupt and 4 companies are declared in good health. In 2020, the Altman Z-Score method predicts that 7 companies will be declared bankrupt and 5 companies will be declared in good health. In 2021, the Altman Z-Score method predicts that 7 companies will be declared bankrupt and 5 companies will be declared in good health. Grover's method in 2019 predicts that 3 companies will be declared bankrupt and 9 companies will be declared in good health. In 2020, Grover's method predicts that 3 companies will be declared bankrupt and 9 companies will be declared in good health. In 2021, Grover's method predicts that no company will be declared bankrupt and 12 companies will be declared in good health. It can be concluded that the Altman Z-Score method is considered optimal in this study to predict bankruptcy rates, assuming aspects of the Altman Z-Score method that highlight the company's profitability so as to affect the deeper accuracy of the company's financial performance.

**Keywords:** Prediction of Bankruptcy, Altman Z-Score and Grover methods

## Introduction

Bankruptcy is a condition of the company that shows the company's inability to operate properly due to severe financial difficulties. If a company goes bankrupt, then it can be said that the company is insolvent a loss of more than 50% of the paid-up capital, no dividends for three years, and no agreement for six months or the company is classified as failing if the company fails to meet its obligations, the company's time to ripeness may go bankrupt even if its total liabilities exceed its total assets (Sukhemi, 2004). The company is bankruptcy if it experience capital loss more than 50%, annable to pay dividend for three years, no transaction for six mounths unable to pay back its liabilities.

There is the threatens global health is a phenomenon COVID-19, including Indonesia in 2020. It starts from World Health Organization (WHO) information on December 31, 2019 there was a cluster case pneumonia with a new etiology in Wuhan city, Hubei province. Increasing cases of COVID-19 are having an impact in the world economy including Indonesia.

The COVID-19 pandemic has been established by PBB impact on transportation, tourism, trade, health and other sectors (Sukhemi, 2004).

The agribusiness economy is a complex agricultural activity in the modern era. Agribusiness economic activities do not only include the farming process, but agribusiness economic activities include all forms of activities related to agricultural processes from upstream to downstream processes (Sholikhah, 2021). The existence of the agribusiness economy in Indonesia has great potential. Indonesia is one of the countries that has fertile soil construction, even Indonesia is dubbed as an agricultural country because of its good agricultural products (Alwiyati & Astuti, 2020; Segarahin, Bayu, 2020).

Geographically, Indonesia is also in a region with a tropical climate, this is also very helpful in developing agribusiness activities. In addition, Indonesia also has a very large water area and maritime country (Rofi, 2023). With these very favorable natural conditions, it is necessary for the people of Indonesia to continue to develop agribusiness economic activities (Sholikhah, 2021). Every company operates with the aim for maximizing profits (Hastuti & Zuhri, 2022). The internal elements of the company are well coordinated, be it capital resources or human resources, good human resource performance that manages the company's capital resources is very important, and the financial sector is a very important area for a company (Ramadhan & Ode, 2016).

Many companies, large and small, are highly valued in the financial sector, especially for growing business world where competition between companies is becoming more intense (Lisnawati & Hastuti, 2020). Not to mention the uncertain economic conditions that cause many companies to suddenly, in order for a company to survive and even develop (Hastuti & Zuhri, 2022). An enterprise must pay attention to its condition and performance. An accurate picture of the company's condition and performance analysis is needed (Ramadhan & Ode, 2016).

Various methods of analysis have been developed to predict the onset of bankruptcy of the company (Hastuti, 2019; Pratama et al., 2021; Romli & Astuti, 2019). One of the mathematical formulas for predicting bankruptcy with a fairly accurate degree of certainty 95% accurate and included in the most popular studies because it is often used by many researchers to conduct research similar studies is Altman z-score method introduced in 1968 a 1968 by Edward I. Altman, a professor of business at New York University (Mastuti et al., 2012). Altman tried to combine several financial ratios into one prediction model using statistical techniques, that is, analysis can be used to discriminate predict the bankruptcy of a company in his research. Altman used five financial ratios aimed at public companies, namely working capital total assets, retained earnings as a percentage of total assets, EBIT as a percentage of total assets, equity market value total debt and sales against all total assets. From the results of the calculation, it will be seen that the Z score can assess the finances in a company that is in a safe, vulnerable situation, or in a bankruptcy situation (Mastuti et al., 2012).

Another method used to predict bankruptcy is the Grover method which a redevelopment of the Altman method. The method uses the instrumentation of the calculation of working capital as a percentage of total assets, EBIT as a percentage of total assets, and returns on assets (Utari, 2021). Grover's analysis calculations are the most accurate analysis for predicting the insolvency of Indonesian food and beverage companies outperforming the other three methods, such as the Zmijewski, Ultraman and Springgate methods. Grover's

computing tools have predictive power. It helps predict the bankruptcy of companies on the stock exchange compared to the other three models namely the Zmijewski, Foster and Springate models (Utari, 2021).

Agricultural sector companies in recent years have been to bankruptcy. In a statement by the Minister of Finance of Indonesia, Sri Mulyani Indrawati said that state-owned companies in the industrial sector and the agricultural sector are companies that are vulnerable to bankruptcy due to poor scores on this index. The Director General of State Assets of the Ministry of Finance, Isa Rachmatarwata mentioned that one of the reasons many state-owned companies, especially agricultural sector companies, are in the red zone. It can be seen at the lack of current asset in this companies (Patel, 2019).

Oktaviandri et al. examined to compare four bankruptcy prediction models, namely the Altman, Springate, Ohlson, and Grover models as the best predictors in analyzing bankruptcies in companies in the agricultural sector listed on the IDX for the period 2011-2015. The results of the analysis show that there is a difference between several prediction models and the best prediction model is the Grover model with a conformity rate of 82.86% (Oktaviandri et al., 2017). Limanto examined about the mining and agricultural sector companies that have the potential to go bankrupt or not go bankrupt in 2012-2015 as measured by the Grover method and investigated the comparison of mining or agricultural sectors that are more likely to go bankrupt (Limanto, 2017).

However the results showed that mining and agricultural sector companies are in a healthy condition and there is also no difference between the mining and agricultural sectors (Limanto, 2017). Mandalurang et al. aimed analyzing the bankruptcy often by using the altman z-score and springate methods. The analysis carried out to predict the bankruptcy of a retail company by considering each condition of the company. The results of this study with the two analysis methods has different results are obtained for each other, and there are 9 companies that has potential to bankrupt in certain years (Mandalurang et al., 2019).

Although many related previous research about bankruptcy prediction that use some model to predict conducted, however, the results are still in fluctuatif. Some the models may be good predictive, other are not. Thus, this study attempts to investigate on how Altman z-score and Grover model are able to predict a bankruptcy in agricultural company. Based on the problems above, researchers are interested in conducting research entitled; Analysis of Company Bankruptcy Rate with Altman Z-Score and Grover Methods on Agricultural Companies listed on the Indonesia Sharia Stock Index in 2019-2021.

## Literature Review

Research by Riana to examined four potential level of bankruptcy companies in the Cement Sub Sector listed on the Indonesia Stock Exchange with using the Altman Z-Score. This study uses documentation techniques namely in the form of financial report data on the Cement Sub Sector company, namely PT Semen Indonesia (Persero) Tbk, PT Indocement Tunggal Prakarsa Tbk and PT Semen Baturaja (Persero) Tbk for the 2013-2018 period. The data analysis technique used is descriptive quantitatively using the Altman Z-Score method. The results of the study show the analysis of the level of bankruptcy using Altman Z-Score at PT Semen Indonesia (Persero) Tbk, PT Indocement Tunggal Prakarsa Tbk and PT Semen Baturaja (Persero) Tbk for the 2013-2018 period are classified not go bankrupt (Risna, 2020).

Based that, the reserch by Mikha Novalina Sinaga et al. to determine the result of prediction analysis of potential bankruptcy on eleven insurance companies sector which has been listed in Indonesia Stock Exchange year 2015 to 2018. Bankruptcy is a condition when a company experiences insufficient funds to run its business. Bankruptcy is uncertainty about the ability of a company to continue its operations if the financial condition held has decreased. In fact, not all companies experience financial management problems that often lead to bankruptcy. Based on the result and conclusions of the analysis using Altman Z-Score method that: in 2015-2018 there were several companies that were safe, namely: PT. Bina Dana Arta Insurance Tbk, PT. Harta Aman Pratama Insurance Tbk, PT. Jasa Tania Insurance Tbk, PT Indonesian reinsurance airline Tbk, PT. Panin Insurance Tbk, PT. Panin Financial Tbk, PT Victoria Insurance Tbk. Then there are companies that in 2015- 2017 are healthy but in 2018 in prone conditions, namely: PT. Bintang Insurance Tbk, and PT. Multi Artha Guna Insurance Tbk, but different from PT. Mitra Maparya Insurance Tbk which in 2015 was in vulnerable condition but in 2016-2018 is safe. and PT. Ramayana from 2015-2018 is in vulnerable condition (Sinaga et al., 2019).

Research by Mandalurang et al. aimed analysis of bankruptcy often used are the Altman Z-Score and Springate Methods. The analysis carried out to predict the bankruptcy of a company by considering each condition of the company. The purpose of this study was to determine the potential of existing bankruptcy on retails trade industry in Indonesia during the period 2014-2018 and compare the two methods of analysis. The population in this study are 25 retail companies in Indonesia with a sample of 12 companies that have the largest sales. Potential Bankruptcy measured by analyzing the financial statements of the company through analysis of the Altman Z Score and Springate Methods. The results of this study with the two analysis methods has different results are obtained for each other, and there are 9 companies that has potential to bankrupt in certain years. Thus, it is advisable for a nine of the companies can improve its financial performance with improving sales, pushing the costs of production as well better understanding the current market situation (Mandalurang et al., 2019).

Based on the previous research above, there are differences in research. The difference in this study with previous research is that in this study the researcher analyzed the comparison of the Altman method and the Grover method against Bankruptcy in Agricultural Sector Industrial Companies registered in the Indonesian Sharia Stock Index. With a post-Covid-19 research period (2019-2021) the selection of the Altman, and Grover method refers to several previous studies that have shown that these methods, have a high degree of accuracy for predicting bankruptcy so that it can be known the circumstances in which the company will go bankrupt or not experience bankruptcy.

### **Research Framework**

Bankruptcy is a condition when a company experiences insufficient funds to carry out its business operations. Bankruptcy is usually associated with financial difficulties. The health of a company can be described from the strongest healthy point to the strongest unhealthy point. Bankruptcy analysis is carried out to obtain an early warning of bankruptcy or early signs of bankruptcy. The earlier the signs of bankruptcy, the better for the management, because the management can make improvements. Creditors and shareholders can make preparations to overcome various problems of bad possibilities. Signs of bankruptcy in this case are viewed using accounting data. For every company, the preparation of a financial

report is very important, financial statements themselves are absolute for companies that go public. Through the financial statements, it can be seen a company's financial performance which includes the financial position and results that have been achieved by the company concerned. Financial statements can be used to predict the bankruptcy of a company using financial ratios.

Financial statements are summaries of a recording process, are summaries of financial transactions that occurred during the relevant financial year, which are made by management (Rambe et al., 2023) with the aim of accounting for the duties imposed on them by the owners of the company and are also used to fulfill other corporate purposes, namely as reports to parties outside the company. Systematically the frame work of. This study can be described as follows (Oktaviandri et al., 2017).

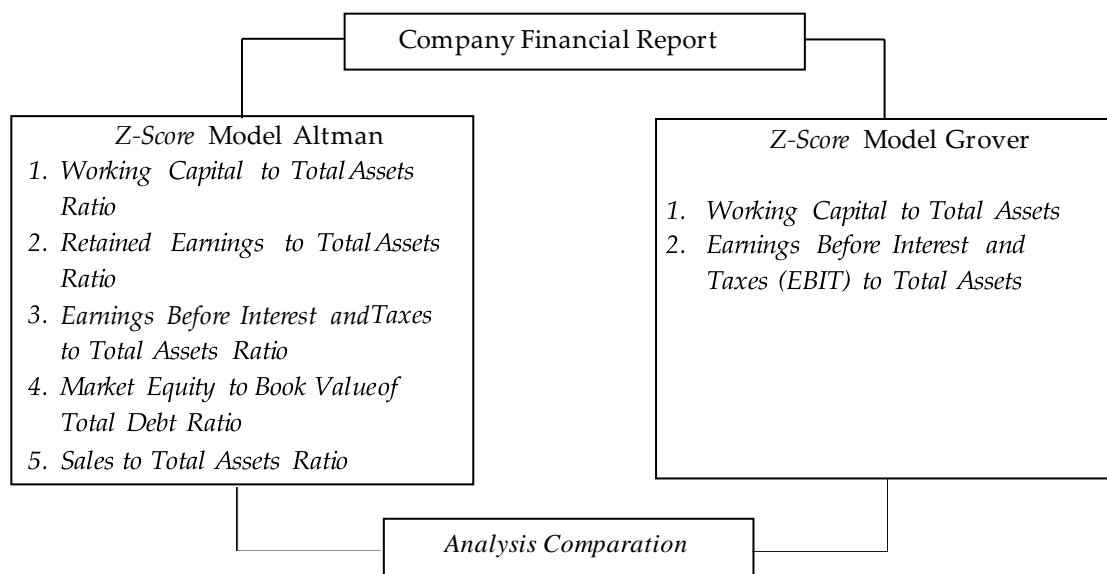


Figure 1. Research Framework

### Research Hypothesis

ROA is a ratio that presents a return on the amount of certain assets utilized by the company. The higher the ratio produced, the better the company will be in managing assets. The better the company in managing assets shows that there is a company's effectiveness in the use of assets so that it can reduce the costs incurred. From the reduction in costs, the company gets adequacy and savings in funds to carry out business. If the funds are sufficient, it will make it less likely that the company will face bankruptcy. According to this study that ROA has a positive influence on the value of Z-Score, the postulate is used as basis in establishing its first hypothesis, namely: H1: ROA has a positive effect on the value of Z- Score (Noviyani & Yulianti, 2022). Based on the theoretical framework above, the research hypothesis is proposed as follows:

*H1: That there is a difference in bankruptcy rate between Model Altman and Grover in agricultural companies listed the Indonesian Sharia Stock Index (Thomas & Indriaty, 2020)*

### Research Methods

This chapter discuss related to achieve these objective discussion continued by explaining at analysis of company bankruptcy rate with altman z-score and grover methods

on agricultural companies listed on the Indonesia sharia stock index for 2019-2021 (Patel, 2019). This chapter described the scope of research, population and samples, data collection techniques and data analysis techniques are included. In this study, the point of attention of a study in this thesis is the use of company financial statements before bankruptcy to measure the bankruptcy rate of agricultural companies listed in the Indonesia Sharia Stock Index in 2019-2021.

The main purpose of a study is to obtain information about characteristics or parameters of the population. The essence of a study is to want to obtain information regarding the characteristics or parameters of an observed object. The observed object it can be seen as a whole (population) or partially (sample) (Risna, 2020). Both choices are made depending on several things. That is, the researcher can decide to use the population as a source of information or simply taken just the sample. The population is the entire subject of the study. In this study, all members of the population became the subjects to be studied. The population to be studied in this study is agricultural industry companies listed in the Indonesian Sharia Stock Index in 2019-2021.

## Result and Discussion

### Company Overview

#### 1. Astra Agro Lestari Tbk (AALI)

PT Astra Agro Lestari Tbk or Astra Agro is a company engaged in oil palm agriculture, as well as running several business activities. Facing challenges in the future, the company has a business strategy that aims to increase efficiency through the application of technology, process analysis in achieving consistency, and eliminating things that are not beneficial to the company. Vision to become the most Productive and Most Innovative Agribusiness Company in the World. Mission to be a role model and contribute to the Development and Welfare of the Nation. The business fields carried out under article 3 of the Company's Articles of association are:

- a. The purpose and objectives of the company are to strive in the fields of agriculture, livestock, and trade, processing industry (agro-industry), transportation, services (scientific and technical professional activities).
- b. To achieve the aforementioned goals and objectives, the Company can carry out business activities as follows:
  - 1) Agriculture and Livestock:
    - a) Oil Palm Fruit Plantation
    - b) Beef Cattle Breeding and Cultivation;
  - 2) Trade:
    - a) Large Trade in Oil-Containing Fruits
    - b) Big Trade in Vegetable Oils and Fats
  - 3) Processing industry (Agro Industry):
    - a) Palm Oil Crude Oil Industry (Crude Palm Oil)
    - b) Palm Oil Cooking Oil Industry
    - c) Artificial Fertilizer Industry Primary Macro Nutrient Mixture
  - 4) Transportation:
    - a) Motorized transport for public goods
    - b) Motorized transport for special goods

- 5) Services (professional, scientific and technical activities):
  - a) Other Management Consulting Activities (Tahunan, 2019a).

## 2. PT. Asia Sejahtera Mina Tbk (AGAR)

PT Asia Sejahtera Mina Tbk is domiciled centrally in West Jakarta city is an Indonesian legal entity established on August 27, 2008. PT Asia Sejahtera Mina Tbk is one of the largest seaweed business players in Indonesia who is committed to always maintaining the quality of seaweed, therefore, until now PT Asia Sejahtera Mina Tbk has developed seaweed cultivation spread throughout Indonesia through cooperation with interested parties. Vision to become the largest and most trusted exporter of seaweed, fishery products and derivatives in the world.

Mision:

- a. Providing the highest quality seaweed, good service, prompt delivery and continuous supply
- b. Dedicating the use of technology to process seaweed
- c. Committed to developing and using environmentally friendly materials
- d. Committed to developing seaweed farming methods that can increase the productivity of seaweed farming
- e. Dedicated to developing environmentally friendly materials from seaweed
- f. Dedicated to developing energy derived from natural resources.
- g. The company produces three types of seaweed, namely:

### 1) Dried Eucheuma Cottoni Seaweed

Is one type of seaweed that can produce kappa carrageenan. Carrageenan is used as a thickener and stabilizer in ice cream, as a coating material for drug capsules, as an adhesive, in filters for processed meats and is widely used in animal food products, as well as giving texture to beverages, such as milk and beer.

### 2) Dried Eucheuma Spinosum Seaweed

It is a type of seaweed that produces a lot of carrageenan which is used as a raw material in the textile, cosmetic and food industries.

### 3) Dried Gracilaria Seaweed

Is a type of red algae that is used to produce agar and plays a role in the pharmaceutical industry and as a medium for the cultivation of certain bacteria (Tahunan, 2019g).

## 3. PT. Andira Agro Tbk (ANDI)

PT Andira Agro Tbk is determined to become a world-class oil palm plantation company that has a vision: to develop palm oil as the basis of food and commodities needed by environmentally friendly industries in the future. We realize that the development of Indonesia's palm oil industry has undergone revolutionary steps, so that it attracts and is of concern to the world community. The reason is that the change of palm oil to world vegetable oil replacing soybean oil, which has been the world's main oil for almost 100 years, has given birth to a new dynamic of global vegetable oil competition. Vision developing palm oil as the basis for the food and commodities needed for environmentally friendly industries in the future. Mission to obtain maximum profit through the development of an environmentally friendly palm oil industry together with surrounding communities.

In accordance with article 3 of the articles of association, the company can carry out business activities with the following scope:

- a. Oil palm fruit plantation, covering plantation activities ranging from land processing, seeding, breeding, planting, maintenance and harvesting of oil palm fruits, including breeding and hatchery activities for coconut fruit plants
- b. The Crude Palm Oil (CPO) industry, includes the business of processing palm oil into crude oil (CPO) which still needs to be further processed and usually this product is used by other industries
- c. The Crude Palm Kernel Oil (CPKO) industry includes the business of processing palm kernel into core crude oil (CPKO) which still needs to be further processed and usually this product is used by other industries
- d. The separation/fractionation industry of palm crude oil and palm kernel crude oil, includes the separation of solid fractions and liquid fractions from palm crude oil into olein palm crude oil and Crude Palm Stearin or from palm kernel crude oil into Crude Palm Kernel Olein and Crude Palm Kernel Stearin which still needs further processing. Products produced: Crude palm oil and palm kernel) (Tahunan, 2019f).

#### **4. PT. Austindo Nusantara Jaya Tbk (ANJT)**

PT Austindo Nusantara Jaya Tbk was established on April 16, 1993 under the name PT Austindo Teguh Jaya (ATJ) with activities in the fields of agribusiness, financial services, health services and renewable energy. Vision of a world-class agribusiness-based food company that improves the quality of human life and nature.

Mision:

- a. Oriented towards people and nature:  
People and nature are the references that guide the Company in every aspect of its business activities.
- b. Persistent in striving for excellence in international standards:  
Strive to meet and exceed local and international standards by implementing good corporate governance.
- c. Sustainable growth for prosperity:  
Realizing broad economic prosperity without sacrificing limited resources.
- d. Integrity:  
Always act appropriately in all situations, regardless of who is watching and whatever the consequences are.

Sago

ANJ operates sago harvesting and processing in South Sorong, West Papua through our subsidiary, PT ANJ Agri Papua (ANJAP). ANJAP manages a 40,000 hectare concession area, where we pioneered the first commercial scale sago harvesting from natural sago forests in Indonesia. ANJAP also processes sago stalks at its sago mill to produce dry sago flour which is sold to the food industry.

Vegetables

ANJ has been engaged in the vegetable sector since 2015, when our subsidiary, PT Gading Mas Indonesia Teguh (GMIT), started cultivating edamame, a type of legume that has high protein and antioxidants that belongs to the soy family group. We use a collaborative model, providing agronomic inputs, training and field support to local farmers in Jember, East



Java to maintain and improve yields and quality. In 2019, we started growing okra, another high-quality vegetable.

#### Renewable Energy

Our subsidiary, PT Austindo Aufwind New Energy (AANE), obtained a business license as an independent power plant (IPP) in 2013 and started its commercial operations in early 2014. AANE operates a 1.8 MW capacity biogas power plant in Belitung Island Plantation which generates electricity by utilizing waste methane gas as a by-product from our CPO mill (Tahunan, 2019h).

#### 5. BISI International Tbk (BISI)

PT BISI Internasional was founded on June 22, 1983. The vision is to provide food for a developing world. Mission with the increasing world demand for food, fuel feed and fiber, we provide innovative products, technologies and support to help farmers increase productivity. The company's activities are corn farming, various bean farming, rice farming, chili farming, post-harvest services, etc. (Keuangan, 2019a).

#### 6. Dharma Samudera Fishing Indonesia Tbk (DSFI)

PT Dharma Samudera Fishing Industries Tbk is a limited liability company domiciled in Jakarta, which has been legally established according to the laws and regulations of the Republic of Indonesia, in accordance with the Deed of Establishment No. 3 dated October 2, 1973.

##### Vision:

To become a high-quality marine product processing producer, by practicing the principles of Good Corporate Governance and participating in preserving the marine natural resources of the archipelago, becoming a foreign exchange earner and provider of employment.

##### Mission:

Establishing partnerships with fishermen and coastal communities of the archipelago and conducting Operational Cooperation (KSO) with suppliers to produce quality products according to market demand and reduce production costs. Being an economic actor and processing marine products that have a competitive advantage, are sustainable, and are able to provide optimal benefits for the company and all related parties.

##### Business Activities Undertaken

##### a. Main Business Activities:

- 1) Running a business in the field of marine fisheries, which includes activities of catching/collecting, transporting and processing various types of fishery products.
- 2) Running businesses in the industrial sector, especially the processing and freezing of fishery products and cold storage.
- 3) Running a business in the wholesale trade sector, not cars and motorbikes, which includes fishery products and processed fishery products.

##### b. Supporting Business Activities:

- 1) Carry out the business of supplying and meeting the needs of supporting materials and raw materials for fishery and industrial business activities referred to in point 1 above
- 2) Carry out other businesses that are related to and support the business activities in point 1 above in accordance with the applicable laws and regulations (Tahunan, 2019b).

### **7. Gozco Plantations Tbk (GZCO)**

PT Gozco Plantations Tbk (formerly PT Surya Gemilang Sentosa) was established based on Deed of Notary Wachid Hasyim, SH, No. 28, dated August 10, 2001 Development and Operation of Plantation, Trading and Processing of palm oil and vegetable oil (crude palm oil) through subsidiaries. The company's vision is to create sustainably the best palm oil company in the world. Mission to develop a strong oil palm plantation company through:

- a. Leverage a strong, professional and dedicated Farm Management Team.
- b. Expanding the plantation area on land that is very suitable for the development of oil palm businesses & strategically located within the group.
- c. Gradually build processing capacity & supporting infrastructure to efficiently place products into market.
- d. Maintaining the strong existing relationship with the surrounding community by developing a smallholder oil palm program & sustainable community development (Tahunan, 2019c).

### **8. PP. London Sumatra Indonesia Tbk (LSIP)**

PT PP London Sumatra Indonesia Tbk, known as "Lonsum", was established in 1906 when Harrisons & Crosfield Plc, a plantation and trading company based in London, England, started its first plantation area in Indonesia located near the city of Medan, North Sumatra. Through a history of more than a century, Lonsum has grown to become one of the leading plantation companies in the world. Lonsum's main activities include plant breeding, planting, harvesting, processing and selling of palm products, rubber, oil palm seeds, cocoa and tea. In the early years of Lonsum's establishment, its plantation diversification included rubber, tea and cocoa. In the 1980s Lonsum began planting oil palm and since then oil palm has continued to grow and has become a major commodity and contributor to the company's growth. Company vision to be a leading agribusiness company that is sustainable in terms of research and development based production, cost, condition (3C). Mission of adding value to "stakeholders" in agribusiness (Tahunan, 2019d).

### **9. PT. Mahkota Group Tbk. (MGRO)**

The company was founded under the name PT Mahkota Group domiciled in Medan, North Sumatra on January 7, 2011 The Company is engaged in the business of processing palm oil and its derivatives. Initially, the Company entered into the palm oil processing business in 2002 through establishment. Vision to become one of the best companies in the world, which prioritizes stakeholder welfare and is environmentally friendly in producing sustainable palm oil. The company's mission is to grow and develop in a sustainable manner by implementing quality, environmental and OHS management systems supported by competent human resources, reliable technology and information systems and a strong financial structure. PT Mutiara Unggul Lestari as a palm oil processing factory located in Riau (Tahunan, 2019i).

### **10. Provident Agro Tbk (PALM)**

PT Provident Agro Tbk (the "Company") is a limited company domiciled in Jakarta and was established based on the Deed of Establishment No.4 dated November 2, 2006 made before Notary Darmawan Tjoa, SH, SE in Jakarta. The company is jointly owned by PT Saratoga Sentra Business and PT Provident Capital Indonesia. Since its inception, the Company has been engaged in oil palm plantations. Vision to become a plantation company that has the best governance in terms of productivity, costs and best practices.

Mission:

- a. Creating added value for Shareholders and stakeholders.
- b. The management consists with best professionals in the industry.
- c. Pay attention to the welfare of employees.
- d. Carrying out a labor intensive oil palm plantation business,
- e. Fully committed to providing the widest possible employment opportunities, contributing to the welfare of the community, especially those around the plantation area (Tahunan, 2019e).

#### **11. Salim Ivomas Pratama Tbk (SIMP)**

SIMP Group is one of the largest diversified and vertically integrated agribusiness groups in Indonesia. Our main activities cover the entire supply chain from research and development, seed breeding, oil palm cultivation and processing to the production and marketing of cooking oil, margarine and shortening products. As a diversified agribusiness group, we also cultivate sugarcane, rubber and other crops. We are one of the largest oil palm plantation companies and one of the market leaders for cooking oil, margarine and branded shortenings in Indonesia. We manage our business activities through two business divisions, namely the Plantation Division and the Edible Oils and Fats Division. Vision to become a leading integrated agribusiness group, and one of the world class groups in the field of research and breeding of agricultural seeds.

Mission:

- a. Being a producer with low production costs through high production yields and effective and efficient operations
- b. Improving the quality of human resources, production processes and technology on an ongoing basis
- c. Exceed consumer expectations by ensuring the highest quality standards
- d. Acting as a company that is responsible in all aspects of managing its business, including healthy and sustainable practices in protecting the environment and social
- e. Increasing value for stakeholders in a sustainable manner (Tahunan, 2019j).

#### **12. SMART Tbk (SMAR)**

Established in 1962 and listed on the Indonesian Stock Exchange since 1992, PT Sinar Mas Agro Resources and Technology Tbk (SMART) is one of the leading integrated and publicly listed palm-based consumer companies in Indonesia. SMART focuses on sustainable palm oil production. SMART's main activities started with managing 138 thousand hectares of oil palm plantations in Indonesia, including plasma lands; harvesting and processing of fresh fruit bunches into palm oil and palm kernel; to process it into various industrial and consumer products such as cooking oil, margarine, shortening, biodiesel and oleochemicals; and trade in palm-based products around the world. Vision to be the best integrated agribusiness and global consumer Product Company and to be the partner of choice. Mission we efficiently provide agribusiness and consumer products, solutions and services, of high quality and sustainability, to create added value for our stakeholders (Keuangan, 2019b).

### **Analyzing Condition of Company Using Altman Z-Score and Grover**

#### **1. Altman Z-Score method**

The Altman Z-Score method uses five financial ratios. To assess the condition of each company, it is necessary to calculate financial ratios using the Altman Z-Score method. These ratios include:

## a. Ratio X1 (Working Capital/Total Assets)

Working capital is defined as current assets minus total current liabilities. Generally, if the company experiences financial difficulties, working capital will fall faster than total assets, causing this ratio to fall. Table 1 is the result of calculations from X1 for agricultural companies in the Indonesian Sharia Stock Index for the 2019-2021 period.

Table 1. X1 (Working Capital to Total Assets)

No	Code	2019	2020	2021
1	AALI	0,107704925	0,149215274	0,113612588
2	AGAR	0,392943718	0,427871537	0,406958164
3	ANDI	0,056806714	-0,016113591	0,047844833
4	ANJT	0,056569622	0,059895971	0,045124245
5	BISI	0,598266745	0,638631359	0,677583694
6	DSFI	0,190615227	0,164418029	0,209786827
7	GZCO	0,048770112	-0,042041287	-0,018160664
8	LSIP	0,168766128	0,212699358	0,304713572
9	MGRO	0,025369981	-0,094545166	0,012014408
10	PALM	-0,002064547	-0,000453282	0,073361773
11	SIMP	-0,058664762	-0,028845045	0,010209398
12	SMAR	0,02885694	0,121426833	0,173728628

Source: data processed by researchers

## b. Ratio X2 (Retained Earnings/Total Assets)

This ratio measures the company's ability to make a profit, in terms of the company's ability to make a profit compared to the speed of turnover of operating assets as a measure of business efficiency or in other words, this ratio measures the accumulation of profits during the company's operation. Table 2 is the calculation result of X2 for agricultural companies in the Indonesian Sharia Stock Index for the 2019-2021 period.

Table 1. X2 (Retained Earnings/Total Assets)

No	Code	2019	2020	2021
1	AALI	0,50609169	0,514896478	0,520086082
2	AGAR	0,010806465	0,007518457	0,016536338
3	ANDI	0,047694767	-0,006144788	-0,009037564
4	ANJT	0,464666619	0,459471427	0,50740566
5	BISI	0,629526945	0,683785029	0,722396895
6	DSFI	-0,235366959	-0,262093838	-0,212158475
7	GZCO	-0,552453764	-0,589979532	-0,612573312
8	LSIP	0,668165951	0,679398337	0,697885072
9	MGRO	0,081311083	0,038472826	0,073456335
10	PALM	0,146322984	0,735439304	0,886050959
11	SIMP	0,254725051	0,266600922	0,289502003
12	SMAR	0,295185498	0,279334473	0,289104849

Source: data processed by researchers

## c. X3 Ratio (EBIT/Total Assets)

This ratio measures profitability, that is, the rate of return on assets, which is calculated by dividing the company's annual earnings before interest and tax by the total assets on the year-end balance sheet. This ratio explains the importance of achieving the company's profit, especially in order to fulfill the interest obligations of investors. Table 3 is the calculation result of X3 for agricultural companies in the Indonesian Sharia Stock Index for the 2019-2021 period.

Table 2. X3 (EBIT/Total Assets)

No	Code	2019	2020	2021
1	AALI	0,024499776	0,052648315	0,095828224
2	AGAR	0,003878532	-0,004449599	0,012086554
3	ANDI	0,034382005	-0,029701074	-0,011659896
4	ANJT	0,011949602	0,023616699	0,089460104
5	BISI	0,137627777	0,125194041	0,152406199
6	DSFI	0,028177502	-0,018724956	0,04661219
7	GZCO	-0,320485934	-0,010361609	-0,001229815
8	LSIP	0,034497007	0,078774668	0,105211953
9	MGRO	0,024538273	-0,031252685	0,060115445
10	PALM	-0,03072348	0,494307692	0,353920724
11	SIMP	-0,005647215	0,028748818	0,063306564
12	SMAR	0,04196318	0,059606287	0,08907522

## d. Ratio X4 (Stock Value/ Total Debt)

The value of the shares in question is the market value of own capital, which is the number of shares of the company multiplied by the market price of stock per share, while the total debt includes short-term debt plus long-term debt. Generally, a failed company will accumulate more debt than its own capital. Table 4 is the calculation result of X4 for agricultural companies in the Indonesian Sharia Stock Index for the 2019-2021 period.

Table 3. X4 (Stock Value/ Total Debt)

No	Code	2019	2020	2021
1	AALI	2,373622257	2,255573458	2,29404979
2	AGAR	1,238669957	1,649797876	1,536329465
3	ANDI	1,135893114	1,096885437	1,067905325
4	ANJT	1,640118103	1,646337984	1,975056631
5	BISI	3,709683412	5,384209535	6,749963504
6	DSFI	1,013340479	1,072038561	1,172213649
7	GZCO	0,729189543	0,915947089	1,121952848
8	LSIP	4,921468455	5,674660364	6,059838825
9	MGRO	1,064994104	0,769120455	0,639228027
10	PALM	7,863893876	19,98667594	145,6941224
11	SIMP	1,038051749	1,093726433	1,221895594
12	SMAR	0,648674031	0,556546453	0,556089491

Source: data processed by researchers

## e. Ratio X5 (Sales/Total Assets)

This ratio measures the ability to use assets to generate sales which is the core operation of the company to be able to maintain its viability. Table 5 is the calculation result of X5 for agricultural companies in the Indonesian Sharia Stock Index for the 2019-2021 period.

Table 4. (Sales/Total Assets)

No	Code	2019	2020	2021
1	AALI	0,647017712	0,67696939	0,800069842
2	AGAR	1,937744052	1,925059858	2,191287315
3	ANDI	0,639759511	0,542990944	0,717585202
4	ANJT	0,208332405	0,257959978	0,408783006
5	BISI	0,772651048	0,621878237	0,643361443
6	DSFI	1,217908449	0,978899962	1,35932684
7	GZCO	0,197821354	0,189850391	0,347563865
8	LSIP	0,361791932	0,323792881	0,381858367
9	MGRO	1,4364659	2,863806222	4,01776133
10	PALM	0,081172803	0,059028814	0,053971324
11	SIMP	0,391007171	0,408944541	0,546384391
12	SMAR	1,30267447	1,154403831	1,412919315

Source: data processed by researchers

## f. Calculating the Value of the Altman Z-Score Method

The results of calculating the financial ratios in Tables 1, 2, 3, 4, 5 for each agricultural company in the Altman Z-Score method Next is to calculate the value of the Altman Z-Score model for each of these companies. Then it will produce an Altman Z-Score model value every year from 12 companies, namely:

Table 5. Value of the Altman Z-Score Model of Agricultural Companies for the period 2019-2021

No	Name/ code	2019	2020	2021
1	Astra Agro Lestari Tbk (AALI)	2,224649922	2,329639286	2,581682043
2	PT Asia Sejahtera Mina Tbk (AGAR)	2,757054266	2,913451966	3,17551132
3	PT Andira Agro Tbk (ANDI)	1,303507869	0,893557528	1,155092898
4	PT Austindo Nusantara Jaya Tbk (ANJT)	1,368025803	1,454400805	1,977568446
5	BISI Internasional Tbk (BISI)	3,718948861	4,308044974	5,04828313
6	Dharma Samudera Fishing Ind. Tbk (DSFI)	1,665938435	1,264914166	1,96448092
7	Gozco Plantations Tbk (GZCO)	-0,925024645	0,012118683	0,282397106
8	PP London Sumatra Indonesia Tbk (LSIP)	3,222209173	3,679211374	4,06270878
9	PT Mahkota Group Tbk. (MGRO)	2,044191669	3,048804709	4,535812111
10	Provident Agro Tbk (PALM)	3,410843321	10,61172074	63,14811202
11	Salim Ivomas Pratama Tbk (SIMP)	0,982350479	1,161943414	1,507709602
12	SMART Tbk (SMAR)	1,973604357	1,894700605	2,289843003

Source: data processed by researchers

## g. Determine the Altman Z-Score Method Cut-Off point

The Altman Z-Score method only divides the cut-off point into two parts including:  
Z-Score > 2.6 the company is in good health.

Z-Score < 1.1 the company is in a state of potential bankruptcy.

Based on the determination of the cut-off point above, the potential for bankruptcy of agricultural companies for the 2019-2021 period can be analyzed based on the results of the Altman Z-Score method in table 7, with the following results:

Table 6. Altman Z-Score Method Value PT Astra Agro Lestari Tbk (AALI)

No	Company Name	2019	2020	2021
1	Astra Agro Lestari Tbk (AALI)	2,224649922	2,329639286	2,581682043
		Bankrupt	Bankrupt	Bankrupt

Source: data processed by researchers

According to the table of values for the Altman Z-Score method for PT Astra Agro Lestari Tbk (AALI) in the 2019-2021 period, the results of the calculation of the Altman Z-Score method show that this company in 2019 - 2021 obtained a score less than the cut-off value of 1.1 so that It is predicted that the company has the potential to go bankrupt.

Table 7. PT Asia Sejahtera Mina Tbk (AGAR) Altman Z-Score Method Value

No	Company Name	2019	2020	2021
2	PT Asia Sejahtera Mina Tbk (AGAR)	2,757054266	2,913451966	3,17551132
		Healthy	Healthy	Healthy

Source: data processed by researchers

According to the table of values for the Altman Z-Score method for PT Asia Sejahtera Mina Tbk (AGAR) in the 2019-2021 period, the results of the calculation of the Altman Z-Score method show that this company in 2019 - 2021 obtained a score of more than a cut-off value of 2.6 so that It is predicted that the company has no potential to go bankrupt.

Table 8. PT Andira Agro Tbk (ANDI) Altman Z-Score Method Value

No	Company Name	2019	2020	2021
3	PT Andira Agro Tbk (ANDI)	1,303507869	0,893557528	1,155092898
		Bankrupt	Bankrupt	Bankrupt

Source: data processed by researchers

According to the table of values for the Altman Z-Score method for PT Andira Agro Tbk (ANDI) in the 2019-2021 period, the results of the calculation of the Altman Z-Score method show that this company in 2019 - 2021 obtained a score less than the cut-off value of 1.1 so it is predicted the company has the potential to go bankrupt.

Table 9. PT Austindo Nusantara Jaya Tbk (ANJT) Altman Z-Score Method Value

No	Company Name	2019	2020	2021
4	PT Austindo Nusantara Jaya Tbk (ANJT)	1,368025803	1,454400805	1,977568446
		Bankrupt	Bankrupt	Bankrupt

Source: data processed by researchers

According to the table of values for the Altman Z-Score method for PT Austindo Nusantara Jaya Tbk (ANJT) in the 2019-2021 period, the results of the calculation of the Altman Z-Score method show that this company in 2019 - 2021 obtained a score less than the cut-off value of 1.1 so that It is predicted that the company has the potential to go bankrupt.

Table 10. BISI Internasional Tbk (BISI) Altman Z-Score Method Value

No	Company Name	2019	2020	2021
5	BISI Internasional Tbk (BISI)	3,718948861	4,308044974	5,04828313
		Healthy	Healthy	Healthy

Source: data processed by researchers

According to the table of values for the Altman Z-Score method for BISI Internasional Tbk (BISI) in the 2019-2021 period, the results of the calculation of the Altman Z-Score method show that this company in 2019 - 2021 will obtain a score of more than a cut-off value of 2.6, so it is predicted that the company will no potential for bankruptcy.

Table 11. Value Altman Z-Score Method Dharma Samudera Fishing Ind. Tbk (DSFI)

No	Company Name	2019	2020	2021
6	Dharma Samudera Fishing Ind. Tbk (DSFI)	1,665938435	1,264914166	1,96448092
		Bankrupt	Bankrupt	Bankrupt

According to the value table of the Altman Z-Score method for Dharma Samudera Fishing Ind. Tbk (DSFI) in the 2019-2021 period, the calculation results of the Altman Z-Score method show that this company in 2019 - 2021 obtained a score less than the cut-off value of 1.1 so it is predicted that the company has the potential to experience bankruptcy.

Table 12. Altman Z-Score Method Value Gozco Plantations Tbk (GZCO)

No	Company Name	2019	2020	2021
7	Gozco Plantations Tbk (GZCO)	-0,92502465	0,012118683	0,282397106
		Bankrupt	Bankrupt	Bankrupt

Source: data processed by researchers

According to the table of values for the Altman Z-Score method for Gozco Plantations Tbk (GZCO) in the 2019-2021 period, the results of the calculation of the Altman Z-Score method show that this company in 2019 - 2021 obtained a score less than a cut-off value of 1.1, so it is predicted that the company will potential for bankruptcy.

Table 13. Value Method Altman Z-Score PP London Sumatra Indonesia Tbk (LSIP)

No	Company Name	2019	2020	2021
8	PP London Sumatra Indonesia Tbk (LSIP)	3,222209173	3,679211374	4,06270878
		Healthy	Healthy	Healthy

Source: data processed by researchers

According to the table of values for the Altman Z-Score method for PP London Sumatra Indonesia Tbk (LSIP) in the 2019-2021 period, the results of the calculation of the Altman Z-Score method show that this company in 2019 - 2021 obtained a score of more than a cut-off value of 2.6 so that It is predicted that the company has no potential to go bankrupt.

Table 14. Value Method Altman Z-Score PT Mahkota Group Tbk. (MGRO)

No	Company Name	2019	2020	2021
9	PT Mahkota Group Tbk. (MGRO)	2,044191669	3,048804709	4,535812111
		Bankrupt	Healthy	Healthy

Source: data processed by researchers



According to the value table of the Altman Z-Score method for PT Mahkota Group Tbk. (MGRO) in the 2019-2021 period, the calculation results of the Altman Z-Score method show that this company in 2019 obtained a score less than the cut-off value of 1.1 so it is predicted that the company has the potential to experience bankruptcy. Whereas in 2020 and 2021, this company will get a score of more than a cut-off value of 2.6 so it is predicted that the company will not have the potential to experience bankruptcy.

Table 15. Value Method Altman Z-Score Provident Agro Tbk (PALM)

No	Company Name	2019	2020	2021
10	Provident Agro Tbk (PALM)	3,410843321	10,61172074	63,14811202
		Healthy	Healthy	Healthy

Source: data processed by researchers

According to the table of values for the Altman Z-Score method for Provident Agro Tbk (PALM) in the 2019-2021 period, the results of the calculation of the Altman Z-Score method show that this company in 2019 - 2021 obtained a score of more than a cut-off value of 2.6, so it is predicted that the company will no potential for bankruptcy.

Table 16. Salim Ivomas Pratama Tbk (SIMP) Altman Z-Score Method Value

No	Company Name	2019	2020	2021
11	Salim Ivomas Pratama Tbk (SIMP)	0,982350479	1,161943414	1,507709602
		Bankrupt	Bankrupt	Bankrupt

Source: data processed by researchers

According to the table of values for the Altman Z-Score method for Salim Ivomas Pratama Tbk (SIMP) in the 2019-2021 period, the results of the calculation of the Altman Z-Score method show that this company in 2019 - 2021 obtained a score less than a cut-off value of 1.1 so it is predicted the company has the potential to go bankrupt.

Table 17. Value Method Altman Z-Score SMART Tbk (SMAR)

No	Company Name	2019	2020	2021
12	SMART Tbk (SMAR)	1,973604357	1,894700605	2,289843003
		Bankrupt	Bankrupt	Bankrupt

Source: data processed by researchers

According to the table of values for the Altman Z-Score method for SMART Tbk (SMAR) in the period 2019-2021, the results of the calculation of the Altman Z-Score method show that this company in 2019 - 2021 obtained a score less than the cut-off value of 1.1, so it is predicted that the company has potential went bankrupt.

## 2. Grover's method

In this Grover method uses 3 financial ratios. To assess the condition of each company, it is necessary to calculate financial ratios using the Grover method. These ratios include:

### a. Ratio X1 (Working Capital/Total Assets)

Working capital is defined as current assets minus total current liabilities. Generally, if the company experiences financial difficulties, working capital will fall faster than total assets, causing this ratio to fall. Table 19 is the result of calculations from X1 for agricultural companies listed in the Indonesian Sharia Stock Index for the 2019-2021 period.

Table 18. X1 (Working Capital to Total Assets)

No	Code	2019	2020	2021
1	AALI	0,107704925	0,149215274	0,113612588
2	AGAR	0,392943718	0,427871537	0,406958164
3	ANDI	0,056806714	-0,016113591	0,047844833
4	ANJT	0,056569622	0,059895971	0,045124245
5	BISI	0,598266745	0,638631359	0,677583694
6	DSFI	0,190615227	0,164418029	0,209786827
7	GZCO	0,048770112	-0,042041287	-0,018160664
8	LSIP	0,168766128	0,212699358	0,304713572
9	MGRO	0,025369981	-0,094545166	0,012014408
10	PALM	-0,002064547	-0,000453282	0,073361773
11	SIMP	-0,058664762	-0,028845045	0,010209398
12	SMAR	0,02885694	0,121426833	0,173728628

Source: data processed by researchers

b. X3 Ratio (EBIT/Total Assets)

This ratio measures profitability, that is, the rate of return on assets, which is calculated by dividing the company's annual earnings before interest and tax by the total assets on the year-end balance sheet. This ratio explains the importance achieving the company's profit, especially in order to fulfill the interest obligations of investors. Table 20 is the calculation result of X3 for agricultural companies listed in the Indonesian Sharia Stock Index for the 2019-2021 period.

Table 19. X3 (EBIT/Total Assets)

No	Code	2019	2020	2021
1	AALI	0,024499776	0,052648315	0,095828224
2	AGAR	0,003878532	-0,004449599	0,012086554
3	ANDI	0,034382005	-0,029701074	-0,011659896
4	ANJT	0,011949602	0,023616699	0,089460104
5	BISI	0,137627777	0,125194041	0,152406199
6	DSFI	0,028177502	-0,018724956	0,04661219
7	GZCO	-0,320485934	-0,010361609	-0,001229815
8	LSIP	0,034497007	0,078774668	0,105211953
9	MGRO	0,024538273	-0,031252685	0,060115445
10	PALM	-0,03072348	0,494307692	0,353920724
11	SIMP	-0,005647215	0,028748818	0,063306564
12	SMAR	0,04196318	0,059606287	0,08907522

Source: data processed by researchers

c. ROA (Net Income to Total Assets)

This ratio measures profitability, with the rate of return on assets, by dividing the company's annual earnings before interest and tax by the total assets on the year-end balance sheet. This ratio explains the importance of achieving the company's profit, especially in order to fulfill the interest obligations of investors. Table 21 is the calculation result ROA for agricultural companies listed in the Indonesian Sharia Stock Index for the 2019-2021 period.

Table 20. ROA (Net Income to Total Assets)

No	Code	2019	2020	2021
1	AALI	0,009031952	0,032172045	0,068005539
2	AGAR	0,002156546	-0,004468483	0,009356202
3	ANDI	0,025633537	-0,021222284	-0,00646676
4	ANJT	-0,007284854	0,003475354	0,060800487
5	BISI	0,104367955	0,09456912	0,12163711
6	DSFI	0,021612144	-0,015704265	0,03719596
7	GZCO	-0,030028699	-0,085188297	0,007013682
8	LSIP	0,024706312	0,063673304	0,08357352
9	MGRO	0,018829251	-0,034580043	0,049325983
10	PALM	-0,0303504	0,493030755	0,343300749
11	SIMP	-0,018395491	0,009613857	0,037069841
12	SMAR	0,032341777	0,043961357	0,070130569

Source: data processed by researchers

d. Calculating the Value of the Grover Method

The results of calculating the financial ratios in Tables 19, 20, 21 for each agricultural company in the Grover method next is to calculate the value of the Grover model for each of these companies. Then it will generate the value of the Grover model every year from 12 companies, namely:

Table 21. Agricultural Company Grover Model values for the period 2019-2021

No	Name/ code	2019	2020	2021
1	Astra Agro Lestari Tbk (AALI)	0,318254875	0,482934819	0,571748133
2	PT Asia Sejahtera Mina Tbk (AGAR)	0,718594163	0,747770104	0,769773298
3	PT Andira Agro Tbk (ANDI)	0,268177558	-0,071029439	0,096150218
4	PT Austindo Nusantara Jaya Tbk (ANJT)	0,190899765	0,236275201	0,436950005
5	BISI Internasional Tbk (BISI)	1,51429497	1,538415363	1,695749988
6	Dharma Samudera Fishing Ind. Tbk (DSFI)	0,467777135	0,264298729	0,562411295
7	Gozco Plantations Tbk (GZCO)	-0,953943892	-0,049002053	0,022960832
8	PP London Sumatra Indonesia Tbk (LSIP)	0,453287222	0,677121685	0,919256057
9	PT Mahkota Group Tbk. (MGRO)	0,182690018	-0,205936944	0,282245962
10	Provident Agro Tbk (PALM)	-0,051474834	1,746763961	1,388285881
11	Salim Ivomas Pratama Tbk (SIMP)	-0,059314304	0,107420473	0,289934169
12	SMART Tbk (SMAR)	0,247974085	0,460957456	0,647986372

Source: data processed by researchers

e. Determine the Grover Method Cut-Off point

Grover's method simply divides the cut-off point into two parts:

Z-Score > 0.01 the company is in good health.

Z-Score < 0.02 the company is in a state of potential bankruptcy.

Based on the determination of the cut-off point above, the potential for bankruptcy of agricultural companies for the 2019-2021 period can be analyzed based on the results of the Grover method in table 23, with the following results:

Table 22. Grover Method Value PT Astra Agro Lestari Tbk (AALI)

No	Company Name	2019	2020	2021
1	Astra Agro Lestari	0,318254875	0,482934819	0,571748133
	Tbk (AALI)	Healthy	Healthy	Healthy

Source: data processed by researchers

According to the table of values for the Grover method for PT Astra Agro Lestari Tbk (AALI) in the 2019-2021 period, the calculation results for the Grover method show that this company in 2019 - 2021 obtained a score of more than a cut-off value of 0.01 so it is predicted that the company will not have the potential to experience bankruptcy.

Table 23. Value of the Grover Method PT Asia Sejahtera Mina Tbk (AGAR)

No	Company Name	2019	2020	2021
2	PT Asia Sejahtera	0,718594163	0,747770104	0,769773298
	Mina Tbk (AGAR)	Healthy	Healthy	Healthy

According to the table of values for the Grover method for PT Asia Sejahtera Mina Tbk (AGAR) in the 2019-2021 period, the calculation results for the Grover method show that this company in 2019 - 2021 obtained a score of more than a cut-off value of 0.01 so it is predicted that the company will not have the potential to experience bankruptcy.

Table 24. Grover Method Value PT Andira Agro Tbk (ANDI)

No	Company Name	2019	2020	2021
3	PT Andira Agro	0,268177558	-0,07102944	0,096150218
	Tbk (ANDI)	Healthy	Bankrupt	Sehat

Source: data processed by researchers

According to the table of values for the Grover method for PT Andira Agro Tbk (ANDI) in the 2019-2021 period, the calculation results for the Grover method show that this company in 2019 and 2021 obtained a score of more than a cut-off value of 0.01 so it is predicted that the company has no potential for bankruptcy.

Whereas in 2020, this company will get a score of less than a cut-off value of 0.02, so it is predicted that the company will have the potential to experience bankruptcy.

Table 25. Grover Method Value PT Austindo Nusantara Jaya Tbk (ANJT)

No	Company Name	2019	2020	2021
4	PT Austindo	0,190899765	0,236275201	0,436950005
	Nusantara Jaya Tbk (ANJT)	Healthy	Healthy	Healthy

Source: data processed by researchers

According to the table of values for the Grover method for PT Austindo Nusantara Jaya Tbk (ANJT) in the 2019-2021 period, the calculation results for the Grover method show that this company in 2019 - 2021 obtained a score of more than a cut-off value of 0.01 so it is predicted that the company will not have the potential to experience bankruptcy.

Table 26. BISI International Tbk (BISI) Grover Method Value

No	Company Name	2019	2020	2021
5	BISI Internasional	1,51429497	1,538415363	1,695749988
	Tbk (BISI)	Healthy	Healthy	Healthy

Source: data processed by researchers

According to the table of values for the Grover method for BISI Internasional Tbk (BISI) in the 2019-2021 period, the calculation results for the Grover method show that this company in 2019 - 2021 obtained a score of more than a cut-off value of 0.01 so it is predicted that the company will not have the potential to experience bankruptcy.

Table 27. The Value of the Grover Dharma Samudera Fishing Ind Method. Tbk (DSFI)

No	Company Name	2019	2020	2021
6	Dharma Samudera Fishing Ind. Tbk (DSFI)	0,467777135	0,264298729	0,562411295
		Healthy	Healthy	Healthy

Source: data processed by researchers

According to the value table for the Grover method for Dharma Samudera Fishing Ind. Tbk (DSFI) in the 2019-2021 period, the calculation results of the Grover method show that this company in 2019 - 2021 obtained a score of more than a cut-off value of 0.01 so it is predicted that the company will not have the potential to experience bankruptcy.

Table 28. Grover Gozco Plantations Tbk (GZCO) Value Method

No	Company Name	2019	2020	2021
7	Gozco Plantations Tbk (GZCO)	-0,953943892	-0,04900205	0,022960832
		Bankrupt	Bankrupt	Healthy

Source: data processed by researchers

According to the table of values for the Grover method for PT Gozco Plantations Tbk (GZCO) in the 2019-2021 period, the calculation results for the Grover method show that this company in 2019 and 2020 obtained a score less than the cut-off value of 0.02, so it is predicted that the company has the potential to experience bankruptcy. Whereas in 2021, this company will get a score of more than a cut-off value of 0.01, so it is predicted that the company will not have the potential to experience bankruptcy.

Table 29. Value Method Grover PP London Sumatra Indonesia Tbk (LSIP)

No	Company Name	2019	2020	2021
8	PP London Sumatra Indonesia Tbk (LSIP)	0,453287222	0,677121685	0,919256057
		Healthy	Healthy	Healthy

Source: data processed by researchers

According to the table of values for the Grover method for PP London Sumatra Indonesia Tbk (LSIP) in the 2019-2021 period, the calculation results for the Grover method show that this company in 2019 - 2021 obtained a score of more than a cut-off value of 0.01 so it is predicted that the company will not have the potential to experience bankruptcy.

Table 30. Grover Method Value PT Mahkota Group Tbk. (MGRO)

No	Company Name	2019	2020	2021
9	PT Mahkota Group Tbk. (MGRO)	0,182690018	-0,20593694	0,282245962
		Healthy	Bankrupt	Healthy

Source: data processed by researchers

According to the value table for the Grover method for PT Mahkota Group Tbk. (MGRO) in the 2019-2021 period, the calculation results of the Grover method show that this company in 2019 and 2021 this company obtained a score of more than the cut-off value of 0.01 so it is predicted that the company will not have the potential to experience bankruptcy. Meanwhile, in 2020, this company will receive the score is less than the cut-off value of 0.02 so it is predicted that the company has the potential to go bankrupt.

Table 31. Value Method Grover Provident Agro Tbk (PALM)

No	Company Name	2019	2020	2021
10	Provident Agro Tbk (PALM)	-0,051474834	1,746763961	1,388285881
		Bangkrut	Healthy	Healthy

Source: data processed by researchers

According to the table of values for the Grover method for Provident Agro Tbk (PALM) in the 2019-2021 period, the calculation results for the Grover method show that this company in 2019 obtained a score less than the cut-off value of 0.02 so it is predicted that the company has the potential to experience bankruptcy. Whereas in 2020 and 2021, this company will obtain a score of more than a cut-off value of 0.01, so it is predicted that the company will not have the potential to experience bankruptcy.

Table 32. Grover Salim Ivomas Pratama Tbk (SIMP) Value Method

No	Company Name	2019	2020	2021
11	Salim Ivomas Pratama Tbk (SIMP)	-0,059314304	0,107420473	0,289934169
		Bankrupt	Healthy	Healthy

Source: data processed by researchers

According to the table of values for the Grover method for Salim Ivomas Pratama Tbk (SIMP) in the 2019-2021 period, the calculation results for the Grover method show that this company in 2019 obtained a score less than the cut-off value of 0.02 so it is predicted that the company has the potential to experience bankruptcy. Whereas in 2020 and 2021, this company will obtain a score of more than a cut-off value of 0.01, so it is predicted that the company will not have the potential to experience bankruptcy.

Table 33. Grover SMART Tbk (SMAR) Method Value

No	Company Name	2019	2020	2021
12	SMART Tbk (SMAR)	0,247974085	0,460957456	0,647986372
		Healthy	Healthy	Healthy

Source: data processed by researchers

According to the table of values for the Grover method for SMART Tbk (SMAR) in the 2019-2021 period, the calculation results for the Grover method show that this company in 2019 - 2021 obtained a score of more than a cut-off value of 0.01 so it is predicted that the company will not have the potential to experience bankruptcy.

### 3. Analyzing Difference between Altman Z-Score and Grover Score in Determining Bankruptcy Companies

The comparative analysis that will be carried out in this study, compares the two bankruptcy prediction methods. This was chosen because the purpose of this method is as a means for companies to face the worst possibility of bankruptcy. Companies can also compare the two prediction methods which are better and more accurate in the process of predicting current corporate bankruptcy. Based on the purpose of this comparative analysis, we can do a translation of the results of the potential bankruptcy prediction analysis from the two methods, namely the Altman Z-Score and Grover as follows:

Table 34. Comparison of Bankruptcy Methods in Each Agricultural Company

No	Name/ code	Method	2019	2020	2021
1	Astra Agro Lestari Tbk (AALI)	Altman Z-Score	Bankrupt	Bankrupt	Bankrupt
		Grover	Healthy	Healthy	Healthy
2	PT Asia Sejahtera Mina Tbk (AGAR)	Altman Z-Score	Healthy	Healthy	Healthy
		Grover	Healthy	Healthy	Healthy
3	PT Andira Agro Tbk (ANDI)	Altman Z-Score	Bangkrut	Bangkrut	Bangkrut
		Grover	Healthy	Bankrupt	Healthy
4	PT Austindo Nusantara Jaya Tbk (ANJT)	Altman Z-Score	Bankrupt	Bankrupt	Bankrupt
		Grover	Healthy	Healthy	Healthy
5	BISI Internasional Tbk (BISI)	Altman Z-Score	Healthy	Healthy	Healthy
		Grover	Healthy	Healthy	Healthy
6	Dharma Samudera Fishing Ind. Tbk (DSFI)	Altman Z-Score	Bankrupt	Bankrupt	Bankrupt
		Grover	Healthy	Healthy	Healthy
7	Gozco Plantations Tbk (GZCO)	Altman Z-Score	Bankrupt	Bankrupt	Bankrupt
		Grover	Bankrupt	Bankrupt	Healthy
8	PP London Sumatra Indonesia Tbk (LSIP)	Altman Z-Score	Healthy	Healthy	Healthy
		Grover	Healthy	Healthy	Healthy
9	PT Mahkota Group Tbk. (MGRO)	Altman Z-Score	Bankrupt	Healthy	Healthy
		Grover	Healthy	Bankrupt	Healthy
10	Provident Agro Tbk (PALM)	Altman Z-Score	Healthy	Healthy	Healthy
		Grover	Bankrupt	Healthy	Healthy
11	Salim Ivomas Pratama Tbk (SIMP)	Altman Z-Score	Bankrupt	Bankrupt	Bankrupt
		Grover	Bankrupt	Healthy	Healthy
12	SMART Tbk (SMAR)	Altman Z-Score	Bankrupt	Bankrupt	Bankrupt
		Grover	Healthy	Healthy	Healthy

Source: data processed by researchers

#### a. Comparative Discussion of Bankruptcy Methods

According to the results of the comparative analysis that has been provided above, it can be more easily known which bankruptcy prediction method is considered to be able to fulfill the objectives of the study. The following provides a recapitulation of bankruptcy prediction results for each method for 3 years, namely, as follows:

Table 35. Results of Bankruptcy Prediction Recapitulation Altman Z-Score Method

METHODS	NO	YEAR	PREDICTION		TOTAL
			Bankruptcy Potential	Healthy	
Altman Z-Score	1	2019	8	4	12
	2	2020	7	5	12
	3	2021	7	5	12
<b>The Amount Studied</b>			22	14	36

Source: data processed by researchers

According to Table 4.36 Altman Z-Score result explain that from 12 companies under study, 4 companies were declared to be health and 8 companies having bankruptcy in 2019. However, in 2020 and 2021, there were 7 companies declared to bankruptcy while 5 companies declared to be health. In other word, there are 22 analyzed data show bankruptcy and 14 are in health company during 2019-2021

Table 36. Results of the Grover Method's Bankruptcy Prediction Recapitulation

METHODS	NO	YEAR	PREDICTION		TOTAL
			Bankruptcy Potential	Healthy	
Grover	1	2019	3	9	12
	2	2020	3	9	12
	3	2021	0	12	12
<b>The Amount Studied</b>			6	30	36

Source: data processed by researchers

According to table 4.37 Grover Score result explain that from 12 companies under study, 9 companies were declared to be health and 3 companies having

bankruptcy in 2019 and 2020. However, in 2021, no companies declared to be bankruptcy while 12 companies declared to be health. In other word, there are 6 analyzed data show bankruptcy and 30 are in health condition during 2019-2021

Based on the result above, there are difference rates in terms of number of bankruptcy between Altman Z-Score and Grover, this is supported by Dita Wisnu Savitri's research. The results of the analysis by determining the total accuracy of each method show that Altman's method is the most effective method, in predicting and analyzing delisted companies. Meanwhile, these results, which mention the Altman method, have an accuracy rate of 100% or three companies which are predicted according to the circumstances in which the company after experiencing a delisting (Savitri, 2014). And this research supported by Nurcahyanti and Wahyu research. The results showed that there were significant differences between the results of the bankruptcy analysis of the Altman Z-score model, the Springate model and the Zmijewski model for companies listed on the IDX. The most accurate model based on the post hoc test was the Altman model (Nurcahyanti, 2015).

## Conclusion

Altman Z-Score method, namely, in 2019 it predicts that 8 companies will experience bankruptcy and 4 companies will not experience bankruptcy. In 2020 it is predicted that 7 companies will experience bankruptcy and 5 companies will not experience bankruptcy or be in good health. In 2021 it predicts that 7 companies will experience bankruptcy and 5 companies will be in good health. The results of the bankruptcy prediction analysis using the Grover method, namely, in 2019 it predicts that 3 companies will experience bankruptcy and 9 companies will not experience bankruptcy. In 2020, it is predicted that 3 companies will experience bankruptcy and 9 companies will not experience bankruptcy or be in good health. In 2021, it predicts that no company will experience bankruptcy and 12 companies will be in good health. There is a difference in accuracy between the Altman Z-Score methods, the Grover method, on agricultural companies listed on the Indonesian sharia stock index in 2019-2021. The altman z-score method uses 5 financial ratios, in conducting bankruptcy analysis, while the grover method only uses 3 financial ratios in conducting bankruptcy analysis.

Altman Z-Score bankruptcy method is considered the most accurate and optimal in predicting the level of bankruptcy of a company. It can be seen from a total of 36 data analyzed using the bankruptcy method, 22 were declared bankrupt, 14 were declared healthy. The Grover method predicts that only 6 data analyzed will be declared bankrupt and 30 data will be declared healthy.

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