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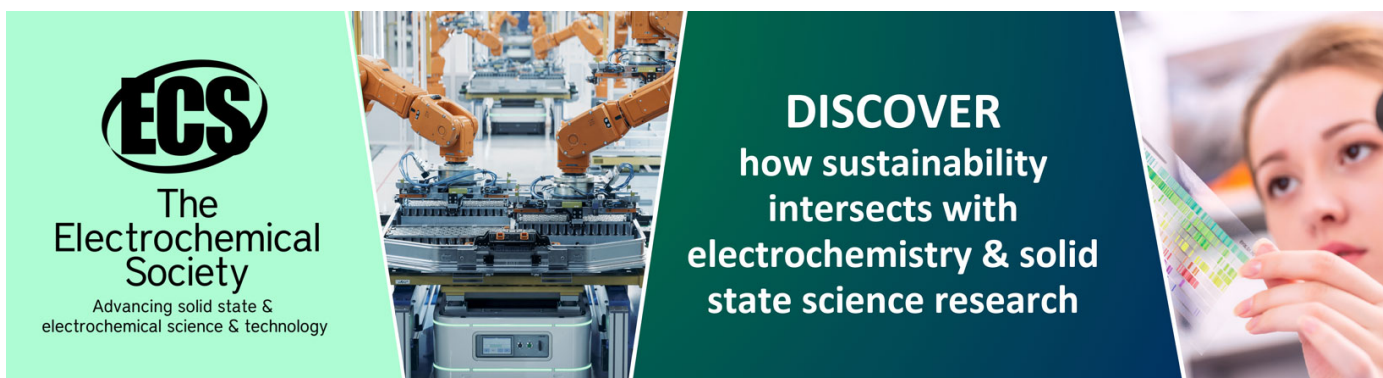
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Does the COVID-19 epidemic impact on economic sustainability of big agricultural firms in Indonesia?

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Abstract. The current research seeks to determine whether the economic sustainability of large agricultural firms in Indonesia be affected by the COVID-19 epidemic. The agricultural sector's economic sustainability assures the food supply chain, which ultimately maintains the nation's food security. In the current research, big agricultural companies are represented by those listed on the Indonesia Stock Exchange (IDX) in two consecutive years, 2019 and 2020. Meanwhile, economic sustainability refers to companies' business performance, which is assessed by some financial ratios, namely the Altman Z-model for forecasting financial difficulties, liquidity, profitability, and leverage. The Altman Z-model is utilized to identify whether the monetary soundness of the business is good, in a precautionary situation, or in bad shape. Surprisingly, our data analysis shows an increase in the sample company's Z score, liquidity, and profitability from 2019 to 2020. The average Altman Z-score indicates that big agricultural companies are financially healthy. The outcomes of the paired samples t test indicate no disparity in the economic performance of Indonesia's largest agricultural firms. This study provides evidence that large agricultural companies are resilient in fighting the COVID-19 pandemic.

1. Introduction

Seventeen developmental initiatives, known as Sustainable Development Goals (SDGs), have been established by the United Nations to enhance the standard of living for persons worldwide by the year 2030. Launched in 2015, the SDGs are a set of fundamental agendas that will contribute to the improvement of multiple elements of life [1]. SDG 1 and 2 objectives relate to people's access to food, namely "no poverty" and "zero hunger," respectively. Therefore, a global food security strategy is essential for all nations. Given that Indonesia now ranks number four in the world's largest population rankings, the assessment of the viability of Indonesia's agriculture sector in the context of food security initiatives is more vital than ever. In addition, the country is a third-world nation with a greater prevalence of food scarcity, child stunting cases, and economic inequality than affluent countries. Hence, the issue of business sustainability in the agriculture sector is believed to be of greater importance for Indonesia [2].

The agricultural sector's economic sustainability guarantees the food supply chain, which ultimately maintains the nation's food security [3]. To gain an understanding of the sustainability of agricultural



businesses, it is necessary to take into consideration a number of elements, such as inputs, processes, the socioeconomic business situation, and the environment, one of which is the effect that the coronavirus (COVID-19) has on the farming industry. The virus might slow or even reverse the steps taken toward all of the SDGs. Government-mandated lockdowns to limit the transmission of the infection will have a devastating effect on the two objectives that rely on reliable access to food, the SGD 1 and 2. As a result of the possible concerns of food shortages, several countries are having a hard time defending their farming industry against the pandemic's detrimental impacts [4].

Throwback to the time when the virus entered Indonesia. As 2019 draws to a close, a potentially devastating coronavirus appeared in Wuhan, China, and spread to almost all countries, including Indonesia. Formerly centered on Jakarta and its immediate suburbs, the virus quickly spread throughout the country, reaching all 34 provinces by April 9, 2020 [5]. Although the first verified cases of the virus showed up in week one of February 2020, the amount of new contaminations has steadily improved daily since then. Therefore, the government has pronounced a public health emergency due to the far-reaching and devastating effects of COVID-19.

The economic indicators disturbed by the COVID-19 outbreak, such as income and unemployment, are often discussed alongside discussions of the many individuals affected. According to the Ministry of Finance [6], until the end of 2020, the realization of tax revenues was recorded at only IDR 1,069.98 trillion, missing the target set by Presidential Regulation No. 72 of 2020 for the Directorate General of Taxes (DGT) of IDR 1,198.82 trillion. The decrease in tax income is due to reductions in tax liability for taxpayers exposed to the COVID-19 epidemic, as stated in the Minister of Finance Regulation (PMK) 2020 [7]. The PMK causes a reduction in the 2020 state revenue target resulting from fiscal breaks for individuals and companies. Meanwhile, as of the second quarter of 2020, the nation's open unemployment rate is predicted to hit nearly 8 percent (a minor impact or setting), 9.8 percent (a moderate setting), and 12 percent (a harsh setting) [8]. As a result, there will be challenges to people's social capital due to increased job losses. COVID-19 also poses difficulties for societal and economic concerns [9], and limited investment, which hinders agricultural output and medical care [10].

In Indonesia, in terms of the pandemic's effect on the agriculture sector, Warsito et al. [10] summarize that the pandemic harms agriculture since people are afraid to leave their homes, delaying horticultural operations and food crop growth. Having to be at home prevents many farmers from running their businesses. Due to inefficiency, agricultural development field personnel cannot do farm routine checks. Therefore, farmers' income drops as their crops deteriorate, pests and diseases spread unchecked, and they have a more challenging time selling their products. The same situation was also experienced by horticultural farmers [11], tomatoes farmers [12], and small scale coffee farmers in Indonesia [13]. The immediate consequences of COVID-19 were seen in the form of a drop in household income, which affected how agricultural expenditures were distributed, affecting productivity in relation to cultivation intensity, especially regarding purchasing and fertilization decisions [13]. Triana et al. [11] document that farmers' most significant risk factors are economic rather than health-related factors.

Some studies also look into the consequences of COVID-19 on the macro-scale farming industry. Malahayati et al. [14] investigate whether the worldwide catastrophe triggered by COVID-19 impacted the performance of the overseas trade value of Indonesian farming products. The results show that the sale value of Indonesia's farming and livelihood products to other countries fluctuates but tends to be positive. The pandemic does not have an effect on the export value of Indonesian farming commodities but rather on the volume of exported agricultural products. Similarly, Arifah and Kim [15] give evidence that agricultural production continued and even contributed to economic expansion despite the COVID outbreak. However, a study reveals that there was a negative abnormal return within two days after Joko Widodo, the leader of the Indonesian Republic, announced the initial occurrence of COVID-19 infection in the country. The negative abnormal stock return demonstrates that investors in the industry felt negative after hearing about the epidemic in Indonesia [16].

To avoid the severe setbacks to operations that can result from the unexpected revelation of food supply chain interruptions due to the financial problems or collapse of a vital agro-food supplier, it is essential to work toward economic sustainability [17]. Financial distress risk prediction is useful for

spotting early warning indications of weakening financial situations so that supply chain operations can be adjusted accordingly [17].

The objective of the present research is to assess whether the COVID-19 wave affected the business sustainability of large agricultural firms. By ensuring the food supply chain, the agriculture sector's economic stability contributes to national food security. Hence, this study examines whether there is any difference in the company's financial performance as measured by liquidity, profitability, solvability, and the Altman Z-score before and after the country's pandemic attack. The Altman Z-score financial difficulty estimation model [18] is used to identify whether the firm's business situation is healthy, in the gray area, or in bad shape. Hence, the score is more informative in assessing the company's performance than evaluating the individual ratios separately, such as liquidity, profitability, and solvability. The utilization of the Altman Z-ratings also distinguishes the current study from earlier ones investigating the business performance of some industry sectors of companies listed on IDX [19,20].

2. Materials and methods

2.1. Materials

For 2019-2020, the research population consists of publicly traded agricultural corporations. There were twenty-four companies in the population. This study's information sources are from annual reports that are obtainable in full on www.idx.co.id or on the websites of each company. Therefore, the availability and completeness of annual reports of listed agricultural corporations on IDX in the two years is taken into account when selecting the sample. The annual report of one company was unavailable. As a result, 23 agricultural firms make up the sample size for this study.

2.2. Variable measurement and data analysis

This research applies economic sustainability by calculating financial health of the sample firms. The financial health was evaluated by four indicators: liquidity, profit gaining, liabilities, and Altman Z-rating. The current ratio appraises the liquidity of agricultural firms. The amount is arrived at by dividing current assets by current liabilities. Return on assets, abbreviated as ROA, is an indicator for profit gaining. This number can be calculated by dividing the total assets by the net income. A measurement of a levered firm is the amount of its total debt. This figure was arrived at by dividing the total liabilities by the total assets.

This research also utilizes Altman Z-rating of financially distressed estimation model [18] to assess the healthiness of the financial condition of the sample company. Some studies have used the model to explain the impact of some economic events, such as the worldwide financial meltdown [21] and ecommerce booming [22], on the performance of a specific industry sector. Other studies have employed the model to assess financial healthiness of companies in an industry [23,24]. Further, when it comes to forecasting whether or not a business will go bankrupt soon, one of the most well-known statistical models is Altman's Z [25]. A formulation of the equation (1) is shown below.

$$Z = 1.2X1 + 1.4X2 + 3.3X3 + 0.6X4 + 1.0X5 \quad (1)$$

Where

X1 = the division of working capital to total asset

X2 = the division of retained earnings to total asset

X3 = the division of earnings before interest and taxes to total asset

X4 = the division of market capitalization to book value of debt

X5 = the division of sales to total asset

The model defines that having a greater Z-score denotes more tremendous economic success [18]. Z-scores can be broken down into the following categories. The firm is not in crisis and is doing well

financially if Z is higher than 2.99. If Z is between 1.81 and 2.99, the business falls within the range of the grey area. The firm is in financial difficulty if Z is less than 1.81.

Because the virus case first appeared in early 2020, the present article conceives of 2019 as the period previous to the pandemic emerged and 2020 as the period subsequent to it did. The paired-sample t analysis was performed to compare the levels of company performance before and following the epidemic spread.

3. Results and discussion

3.1. Descriptive statistic

A summary of the statistical data of the sample firm's financial performance is displayed in Table 1. The table exhibits that the lowest, highest, average, and standard deviation scores for each variable are calculated annually.

Table 1. The descriptive statistics of the economic viability indicators of agriculture firms.

	Minimum	Maximum	Mean	Standard Deviation
ROA 2019	-0.5825	0.1043	-0.0370	0.1408
ROA 2020	-0.1259	0.4930	0.0238	0.1241
Z-SCORE 2019	-1.9279	41.4177	3.9286	8.4827
Z-SCORE 2020	-0.5407	39.678	4.0441	8.1997
Leverage 2019	0.1128	1.1648	0.5854	0.2551
Leverage 2020	0.1498	1.9253	0.6351	0.3526
Current Ratio 2019	0.1064	5.4111	1.7407	1.4030
Current Ratio 2020	0.0601	98.6722	5.7436	20.309
N	23	23	23	23

As disclosed in Table 1, the average value of profitability in the agricultural industry was -0.037 in 2019. It was then raised to 0.028 in 2020. The negative value of profitability indicates that the company is experiencing a loss. The highest profitability was 0.493 in 2020, achieved by PT Provident Agro Tbk, a company engaged in agriculture, trading, and manufacturing related to the agro-industry and palm oil industry. Meanwhile, the mean Altman Z-rating rose a little from 3.93 in 2019 to 4.04 in 2020. The average number of the Altman Z-rating indicates the financial healthiness of the sample firm throughout the monitoring period of two years, as the score is above 2.99. The numbers in the liquidity ratio on average also improve highly, from 1.74 in pre-COVID-19 time to 5.74 in post-COVID-19 time. The above-mentioned scores or ratios indicate that the sample company's business performance was better in the period previous to pandemic than in the period subsequent to pandemic. In terms of leverage, there was a slight rise in the mean score of the ratio in 2019 compared with 2020.

Table 2 exposes the descriptive statistic of the categorization of Z-rating in 2019 and 2020, pre and post-pandemic time, respectively. The table shows that eleven companies out of twenty-three that account for 47.8 percent of the total sample in the financially distressed category. Eight companies were economically healthy in 2019, which accounted for about 35 percent of the sample, but the number decreased to seven companies in 2020. The number of companies in the gray area category is 4 and 5, respectively, in 2019 and 2020. These numbers suggest that one company moved from a healthy condition in 2019 to a gray area in 2020. Hence, agricultural firms' bottom lines are unlikely to be negatively impacted by the COVID-19 epidemic as evaluated by Altman's Z-rating categories.

Table 2. Z-score categorization in the period prior and post-COVID-19 pandemic.

Category	The year 2019		The year 2020	
	Frequency	Percentage	Frequency	Percentage
Distress	11	47.8	11	47.8
A grey area	4	17.4	5	21.7
Healthy	8	34.8	7	30.4
Total	23	100.0	23	100.0

3.2. The difference in financial performance in the period pre and post-COVID-19 hit

This research applied the paired t-test to determine whether the financial performance of the agriculture business prior to and preceding the COVID-19 outbreak differed. Table 3 displays the output of the mean difference analysis.

Table 3. Paired t-test data analysis results.

	Mean Pre	Mean post	t	Sig
Z_SCORE 2019_2020	3.9286	4.0441	-0.314	0.757
ROA 2019_2020	-0.0370	0.0238	-1.872	0.075
Current Ratio 2019_2020	1.7411	5.7436	-0.986	0.335
Leverage 2019_2020	0.5854	0.6351	-1.116	0.276

As displayed in Table 3, the sig value of the Z-score, profitability, current ratio, and leverage are all above 0.05. The results suggest no differences in the business condition of big agricultural companies in the time prior to and following the pandemic's arrival in Indonesia. Drawn from the results of descriptive statistics, the average value of Z-score, profitability, and liquidity shows a positive trend in the post-pandemic period compared to those before the pandemic. Even the profitability variable shows marginally significant increases (significant at a 10 percent level) compared to those before the pandemic in the post-pandemic period. These findings imply that despite any obstacles smallholder farmers face due to the pandemic restrictions, big agricultural companies show their resiliency to the immediate outcome of the corona virus disease.

The reason why big agricultural companies are powerful in facing the virus disease is probably because the vast majority of agriculturally specialized public companies are in the palm oil business, or the size of palm oil companies is dominant in the industry. The healthy financial performance may be attributed to the return of palm oil prices to their highest level, i.e., similar to the 2007 and 2012 highs, which boosted government revenues and trade surpluses and so spurred the present recovery [26]. Indonesia is well-known for being one of the top three palm oil exporters [27]. As an illustration regarding the size of the oil palm industry in the country, based on the sample company annual report in 2020, one company, namely PT Sinar Mas Agro Resource and Technology (SMART) Tbk, had a revenue of IDR 36.19 trillion. The number is about 3.4% of the realization of Indonesia's tax revenue in 2020. Besides, the agricultural industry is included in the real sector, which absorbs much labor. The government gives this industry a tax incentive. The granting of tax breaks is an emergency measure taken by the government with the intention of corporations not implementing employee reductions due to corporate financial problems [14]. All of these reasons show how strong big agricultural companies are against the COVID-19 pandemic.

Finding that agricultural corporations in Indonesia have sound business performance despite the virus epidemic corroborates earlier research that used macroeconomic indicators. Our result confirms Arifah

and Kim's [15] argument that agriculture managed to survive the COVID epidemic and continued to make significant contributions to the expansion of the economy.

4. Conclusions and suggestions

The current research aims to scrutinize whether the agricultural sector is experiencing a direct impact from the global spread of the COVID-19 epidemic. The epidemic may disrupt the economic sustainability of the agriculture industry, which in turn affects food security. In this study, economic sustainability was assessed through the Z-model of financial difficulties and financial ratios. Interestingly, the data analysis reveals an increase in the sample company's Z-score, liquidity, and profitability from 2019 to 2020. The average Altman Z-score indicates that big agricultural companies are financially healthy. The paired t-test reveals that the largest agricultural firms in Indonesia do not differ in their business performance. This study implies that large agricultural companies are resilient in struggling against the COVID-19 pandemic.

There are drawbacks to this study that could be elucidated in follow-up studies. First, the observation period, which covers only a year before and a year after the pandemic spread, may be inadequate to portray the resilience of big agricultural companies in coping with the COVID-19 pandemic. Further study may increase the window period to prove the upward trend of big agricultural companies' business performance. The findings of this research may not be generalized to other real industry sectors.

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