Research Article

Does COVID-19 Affect the Business Sustainability of Mining Industry? Some Indonesian Evidence

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Abstract.
This study aims to investigate whether COVID-19 affects business sustainability in terms of the economics of the mining industry in Indonesia. Specifically, this article examines whether the economic sustainability of mining companies improved or worsened after the COVID-19 attack on the country. The current research measures economic sustainability using the Altman Z financial distress model and profitability. Using 43 publicly listed companies in the mining industry as a sample, the analysis of the Wilcoxon signed rank test reveals that the Altman Z score increases significantly in the period after the COVID-19 contagion as compared to those before the contagion. Meanwhile, there is no difference in the profitability of the mining industry before and after the COVID-19 contagion. The results suggest that the mining industry remains strong despite the huge effect of the COVID-19 pandemic, which led to a decrease in the coal price due to the large scale social restrictions. The financial performance of the mining industry shows an improvement, as marked by an upward trend in the Altman Z score from 2018 to 2021. The profitability of the mining industry has been stable from 2018 to 2021. This study offers evidence of the mining industry's financial condition in the Indonesia Stock Exchange (IDX) when COVID-19 attacked Indonesia, at a time when the gold price reached its maximum and the president banned the export of mining products' raw materials.

Keywords: economic sustainability, financial performance, Altman Z-score, financial distress, profitability, COVID-19

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1. Introduction

The mining industry makes a substantial contribution to Indonesia's economy. In 2018 and 2019, the mining and coal industries accounted for 4.5 and 5 percent of GDP (gross domestic product), respectively[1]. Indonesia is a potential country for the various mineral resources. For that reason, Indonesia become the world's third-largest producer of nickel minerals. In addition, the country placed second only to China in terms of its

contribution to gold products, at 39 percent(2). This fact guarantees that Indonesia will always be among the world's top 10 countries.

The mining industry has a great deal of untapped potential and is a source of governmental revenue outside of taxation (PNBP). Figure 1 depicts the production of prominent mining products in the country in 2020. Nickel leads Indonesia's mining industry with an output of 35.5 million metric tons, followed by gold and silver with 29.69 million metric tons, and bauxite with 26 million metric tons.

COVID-19 officially reached Indonesia in early March 2020, at the time when President Joko Widodo announced the first confirmed infection case in the country. The Indonesian government then announced a strategy of large-scale social limitations (PSBB), limits on travel, and increased COVID-19 swab testing in an effort to curb the spread of COVID-19. Work-from-home (WFH) was mandatory for all non-strategic industries, and the government regulation restricts community activities near certain public facilities. As a consequence of such policy, the country's economy faced a downturn. The Jakarta Composite Index (IHSG) fell to minus five percent in December 2020 as compared to the same time last year. The mining industry experienced distress with a decrease of 18 percent in the composite index in July 2020 (3). However, at the end of 2020, with a rise to about 24 percent from the previous year's negative 13 percent, the mining industry maintained its resilience and emerged as the most unaffected by COVID-19 (4).
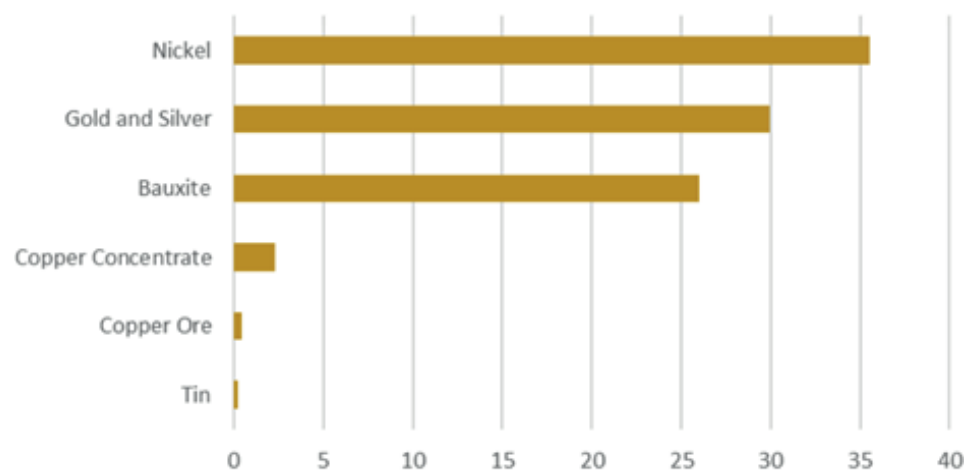

Figure 1: Production of Top Mining Products in Indonesia 2020 in Million Metric Ton (5).

On the other hand, global social restrictions, WFH, and travel bans have led to a significant decline in demand for coal, oil, and electricity. In 2019, coal was the dominant source of energy for about 58 percent of China's economy (6). This was notably true for the electric power industry. Because China is the country with the highest export value

for Indonesian mining products, the pandemic's negative impact on China's economic activities will result in a decrease in demand for both electricity and energy. There is a correlation between the decline in the price of coal and the subsequent decrease in power consumption.

Similarly, the COVID-19 pandemic has resulted in a significant decline in the demand for oil. The use of fuel for transportation activities such as gasoline, diesel oil for passenger vehicles, and aviation fuel for aircraft decreased due to the travel ban. Conversely, the use of natural gas in households (for cooking and heating) increases during social distancing or lockdown (7).

Despite the drop of oil and coal prices, the gold price reached its highest record for the last four decades in July 2020 (8). The economic downturn and global uncertainty raise the level of panic, which causes investors to pour money into the gold market and eventually drives up prices. The widespread poor economic data that resulted from the COVID-19 issue contributed to the rise in gold prices, which derived from robust demand for safe investment. In April 2020, the gold-to-copper price ratio, which is considered a barometer of global risk sentiment, achieved a new all-time high. Financial institutions have been purchasing gold, along with an increasing number of individual investors who put funds into the commodity over the first half of 2020 (9).

This study aims to determine if COVID-19 has any effect on the financial health of Indonesian mining firms. Specifically, this study contrasts the financial healthiness of the mining industry in the period before and after the COVID-19 contagion. Indonesia is relevant to the study because, as discussed earlier, it is one of the world's biggest mining producers. The fluctuation in mining products' prices due to COVID-19 would impact the mining industry's revenue, which in turn would affect the financial condition of the companies.

Research studies that investigate the financial performance before and after COVID-19 are extensive. In Indonesia, Devi et al. (10) and Andini and Amboningtyas (11) investigate the financial performance of companies in all sectors listed on IDX. The results indicate a reduction in the financial performance of the sample companies, as marked by the decline in liquidity, profitability, and activity ratios and the increase in solvency ratio (11). Further testing on the company sector reveals that the consumer goods industry experiences an increase in financial performance while the property, real estate, and building construction sectors, as well as the finance, trade, services, and investment sectors, face financial difficulty (10).

Other studies scrutinize the financial performance in the specific industry or companies included in an index. The industry includes manufacturing (12), hotel, restaurant,

and tourism(13),(14),(15), health sector (14),(16), telecommunication services (14), pharmaceuticals (17), food and beverages (18), construction by state-owned companies (19), and companies involved in LQ 45 index (20). The results vary depending on the sector's vulnerability to the COVID-19 pandemic.

In terms of the mining industrial sector, Devi et al. (10) have documented that on average, profitability in 2020 was lower as compared to that in 2019. At the same time, the industry has a higher current ratio and solvability in 2020 than in 2019. Meanwhile, Nugroho and Payamta (21) examine the differences in the financial viability of the mining industry in 2019 and 2021. The results show that the mining industry is doing well financially, as it is making more return on assets (ROA), growing its sales, and having a lower solvability ratio in 2021 as compared to those in 2019.

Some other studies observe the financial performance of mining companies individually rather than whole companies in the industry, for example, Perusahaan Gas Negara Tbk (PGN) (22) and PT Aneka Tambang Tbk (Antam) (23). An assessment of the financial condition of a government-owned natural gas company, namely PGN, in the first six months of 2020 indicates that PGN was in good financial condition, although there was an economic slowdown. In the first and second quarters of 2020, profitability and liquidity tend to be stable (22). Meanwhile, an Antam Company study reveals a decline in financial indicators, as evidenced by a drop from a near-healthy rating to an unhealthy rating based on the Ministry of State Owned Enterprises assessment criteria (23).

In line with the research objective as stated above, the present study investigates the financial performance of the mining industry over a longer period, i.e., from 2018 to 2021. Financial assessment during the COVID-19 contagion covers two years, 2020 and 2021, while before the disease, it covers 2018 and 2019. A longer assessment may evaluate the trend of financial performance. Unlike previous studies that assessed financial performance using some ratios, this study utilized the Altman Z-score bankruptcy forecasting model. The model may evaluate the financial condition of mining companies, whether they are in good health, in a gray zone, or in distress.

The signalling theory is used to formulate the study hypotheses. The financial performance assessment provides a signal to the investor so that the investor may use the signal to make the right investment decision. When attempting to describe behavior between two parties (individuals or institutions) who have access to differing information, signalling theory can be helpful. In most situations, one person (the sender) must decide whether and how to convey (or signal) the information, and the other party (the receiver) must decide what the signal means(24).

Previous studies that compare the financial performance of the mining industry in the period before and after COVID-19 provide conflicting results. While Devi et al. (10) compared 2019 to 2020 and found that the mining industry's financial performance admitted the negative effect of the pandemic by lowering profit and rising debt, Nugroho and Payamta (21), who compared 2019 to 2021, found that the mining industry gained power by making more profit and lowering debt. Hence, as discussed earlier, this study will examine using the Altman Z-score and observing a longer period (2018-2021) to overcome previous study limitations.

Based on the fact that there has been an improvement in the gold price due to COVID-19, this study expects that the financial performance of the mining industry will improve during the disease period. Furthermore, as stipulated in the Minister of Energy and Mineral Resources Regulation 2019 (25), President Joko Widodo has prohibited the trade of raw nickel material (ore nickel) to other countries beginning in 2020 in order to increase value-added production and profit. This study believes that the regulation may enhance the net export surplus of Indonesia's mining products and increase the mining industry's profit. Hence, this study predicts that the financial performance of the mining industry after the COVID-19 contagion is better than that before the contagion.

The study consists of four sections. The first section elaborates on the motivation of the study and hypothesis development. The second section explains about the research method. The third section presents the results of the data analysis. The fourth section accomplishes with a conclusion.

2. Method

2.1. Sample

Mining firms listed on IDX from 2018 to 2021 are the population of this research. The sample is selected based on whether the research data is complete and available for four years in a row in the annual report. Annual reports are the source of research data. It can be downloaded from the company website or the IDX website. The chronology of sample selection is presented in Table 1. The final sample is forty-three mining companies, representing 91% of the population.

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TABLE 1: The chronology of the sample.

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Criteria	Number
Companies that were listed in 2018-2021	47
Companies whose annual reports were unavailable or whose required data were incomplete	(3)
Company that converted its core business, not mining	(1)
Final sample	43

2.2. Variable Definition and Data Testing

For measuring the economic sustainability, following previous studies (26,27) this study employs the Altman Z-score bankruptcy prediction model (28). Previous researches (29–31),supports the use of the Altman Z score to assess financial condition. The formula to calculate the Altman Z score is as follows:

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 1.0X_5 \quad (1)$$

Where

X_1= a ratio of working capital divided to total asset

X_2= a ratio of retained earnings to total asset

X_3= a ratio of earnings before interest and taxes to total asset

X_4= a ratio of market capitalization to the book value of debt

X_5= a ratio of sales divided by total asset

As proposed by Altman (28), when the Z score is larger, the company is doing well financially. The Z-score can be broken down into the following subcategories: If the company's Z is greater than 2.99, it is considered a healthy and good performer financially. If the company's Z score falls between 1.81 and 2.99, financial health is uncertain and in the gray zone. If the company's Z score is less than 1.81, it is considered to be in a difficult financial position. This study also uses ROA to measure how much profit a company is making. ROA is a ratio of net income to total assets.

To compare the financial performance of the mining industry in the period before and following the COVID-19 contagion, this study deploys either the paired t-test or the Wilcoxon signed rank test, depending on the normality of the data. This study contrasts the Z score in 2018 and 2019 (the pre-COVID-19 period) with 2020 and 2021 (the post-COVID-19 period). This study examines and contrasts the average of the Z score within the two years of the pre- and post-COVID-19 period. This study also applies the same step to ROA.

3. Result and Discussion

3.1. Descriptive Statistics

Table 1 displays the lowest, the highest, and the average scores of Z score and ROA data. Zbefore and Rbefore refer to the average Z score and ROA prior to the pandemic contagion, respectively, while Zafter and Rafter refer to the average Z score and ROA post-pandemic, respectively.

TABLE 2: Descriptive Statistics of Economic Sustainability.

Variable	Mean	Minimum	Maximum	SD
Z 2018	2.81	-2.14	18.87	3.36
Z 2019	2.29	-4.33	13.17	2.81
Z 2020	2.99	-1.27	16.51	3.68
Z 2021	4.82	-1.24	23.67	5.40
Zbefore	2.55	-1.91	16.02	2.96
Zafter	3.90	-0.84	20.09	4.15
ROA 2018	4.04	-51.05	45.56	13.78
ROA 2019	0.88	-53.83	18.33	11.14
ROA 2020	0.20	-18.70	21.27	7.46
ROA 2021	19.30	-31.59	564.93	86.40
Rbefore	2.46	-30.05	31.95	10.43
Rafter	9.75	-23.40	273.11	42.33
N	43	43	43	43

As presented in the above table, the mean score of Altman Z in years prior to the coronavirus contagion is lower than those following the contagion, i.e., 2.81 and 2.99 versus 2.99 and 4.82. When comparing Zbefore to Zafter, this study observed the same pattern, with scores of 2.55 and 3.90, respectively. In other words, the financial healthiness of mining companies improves in the phase subsequent to COVID-19.

In terms of ROA, although there was a decline in the mean score of ROA from 2019 (0.88) to 2020 (0.20), the number then rose to 19.30 in 2021. The average Rafter improves to 9.75 from the average Rbefore of 2.46. In summary, the average ROA also increased in the time after the pandemic spread compared to before the pandemic spread.

The highest Z score was 23.67, obtained by PT Transcoal Pacific Tbk in 2021, while the smallest Z score was -4.33, obtained by PT Mitra Investindo Tbk in 2019. The company that got the highest profit (564.93) was PT Alumindo Light Metal Industry Tbk in 2021, while PT Mitra Investindo Tbk obtained the biggest loss in 2019 with a ROA of -53.83.

The fact that the maximum score of the two variables was achieved in 2021 indicates that the performance of the mining industry in general increased in the period after the pandemic.

Figure 2 portrays the grouping of the Altman Z score both prior to and following the pandemic. The figure shows that the number of companies included in the distress category fell from 21 to 16 in the time prior to the pandemic as compared to the period preceding the pandemic. The number of companies that were in good shape for economic sustainability increased from 16 to 22 in the period before and after the contagion. Hence, the figure supports the descriptive statistics table that the quality of Z-score grouping in time after is better than that before the corona virus spread.
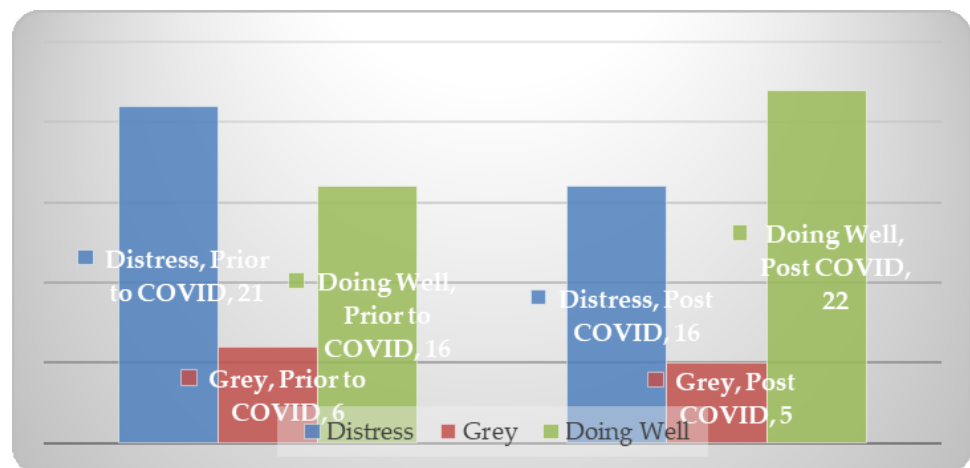

Figure 2: The grouping of Z-score in the time before and after the pandemic spread.

3.2. Test the Statistical Difference

Table 3 depicts the results of the Wilcoxon signed rank test of Z score and ROA in two different timeframes, pre- and post-pandemic. The Wilcoxon test was used to analyze the statistical differences because the normality test using the Kolmogorov-Smirnov test suggests that the data for Zbefore and Rafter is not normally distributed. As presented in Table 4, the sig values of those variables are below 0.05, i.e., 0.038 and 0.00, respectively. Hence, the non- parametric test is suitable to test the statistical differences of Z-score and ROA in time before and after the pandemic spread.

According to Table 3, the sig value of the comparison test between Altman Z in time before and following pandemic (Zbefore and Zafter) is 0.002, far below 0.05. The number suggests that the difference in the increased Z score following the COVID-19 outbreak is significant. Hence, consistent with the expectations of the study, the

business sustainability in terms of the economic performance of the mining industry in Indonesia rises significantly amidst the COVID-19 spread.

TABLE 3: The Results of the Wilcoxon Sign Rank Test.

Variable	Mean rank negative		Mean rank positive	Z	Sig. (two tailed)
Zbefore and Zafter	15.43		25.17	-3.103	0.002
Rbefore and Rafter	20.83		21.13	-0.719	0.472
N	43		43	43	

In terms of profitability, the comparison test between ROA in the phase previous COVID-19 and following COVID-19 shows no significant difference. As displayed in Table 3, the significance value is 0.472, far higher than 0.005, which marks the non-significance. Hence, although the mean ROA improves from 2.46 (Rbefore) to 9.75 (Rafter), the increase is not statistically significant. In other words, the profitability of mining industries remains stable despite the disruption of many sectors due to the impact of COVID-19 globally. The results seem to support Gultom et al.(32), which expose that ROA in mining firms has risen but is insignificant.

TABLE 4: The Results of the Kolmogorov Smirnov Test.

Variable	Mean	Standard Deviation	Test Statistic	Sig. (two tailed)
Zbefore	2.55	2.96	0.138	0.038
Zafter	3.90	4.15	0.126	0.083
Rbefore	2.46	10.43	0.124	0.093
Rafter	9.76	42.34	0.370	0.000
N	43	43	43	

The results of the comparison test of Z score and ROA reveal evidence that mining industries in Indonesia show their power amidst the COVID-19 outbreak. COVID-19 presents business opportunities to the mining industry in Indonesia, either through the increased demand for mining products during difficult situations or the implementation of new regulations. This study also offers evidence that banning the export of raw nickel at a time of coincidence near the COVID-19 outbreak contributes to the positive performance of the mining industry in general in the country.

4. Conclusion

The current research aims to observe whether there was a disparity in the financial sustainability of the mining industry following the COVID-19 epidemic in Indonesia. The research measures financial sustainability using the Altman Z-score financial distress projection model and ROA. Using a sample size of 91 percent of the population, the Wilcoxon signed rank test demonstrates that Z score and ROA rise subsequent to the COVID-19 bump. The increase is statistically significant for the Z score but not for ROA. The results suggest that Indonesian mining industries demonstrate their ability to endure in the face of the COVID-19 pandemic. This paper presents empirical information regarding the financial state of the mining business on the IDX during the onset of the COVID-19 pandemic in Indonesia. This period marked a peak in gold prices and the implementation of a presidential restriction on the export of raw materials from the mining sector. This study exploits only the Altman Z-score model and ROA to measure financial sustainability; in fact, there are other models to assess the financial soundness of a company, such as the Zmijewski and Springate bankruptcy forecasting models. Future research may use these other measurements to see the consistency of the results.

Acknowledgements

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