

Analysis Fluctuation of Stock Price of Mining Companies that Listed on Indonesia Stock Exchange Before and After Covid-19 Pandemic

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Abstract

The COVID-19 pandemic has affected a number of activities in Indonesia, particularly economic activities. Transactions on the capital market also have an impact, one of the financial assets that is affected by a pandemic is the stock price. In this study, an analysis was conducted to determine if the COVID-19 pandemic could actually affect stocks which focused on mining sector companies which work on metal and mineral products. We make an assumption that COVID-19 pandemic was occurred in Indonesia on March 2020 and we observe the fluctuation of price stock a year before and after Pandemic epidemics in Indonesia with Wilcoxon Test on each Company's price stock. Based on the Wilcoxon test, the price stock of three companies from seven company samples was found to be a significant change in the specified sample period. By using AHP method to processing the questionnaire and SWOT analysis, the result of the integration strategy from selected company is strength-weakness (SW) strategy. All the strategies that have been made are strategies that provide the company in order to make more profit based on their strength and the threat that surrounds the company.

Keywords

Stock price, Covid-19, Analytical Hierarchy Process, SWOT Analysis

1. Introduction

The coronavirus is a virus within the group of viruses that cause SARS and MERS. However, SARS-CoV-2 that caused Covid-19 spreads faster throughout the world and more easily to mutate (Singhal 2020). But this pandemic affects not just health, but also the country's economy. Indonesia's economic growth is one of the indicators that would allow us to know that there is something wrong in economic activity during the pandemic.

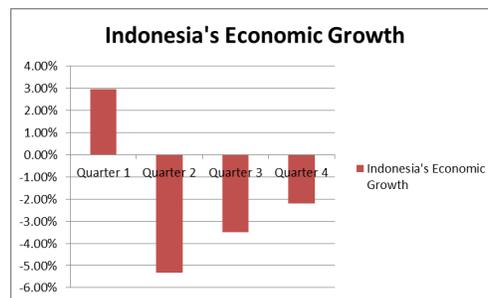


Figure 1. Indonesia Economic Growth in 2020

Source: <https://www.bps.go.id/>

According to Figure 1, economic growth in 2020 has declined significantly from quarter 1 (2.97%) to quarter 2 (5.32%). And Indonesia officially entered the recession in Q3. This is due to the fact that economic growth is still

below zero or below during two consecutive quarters. The recession has a great influence on the economy of the country and certainly affects the economy of the community. The presence of a recession affects market prices and decreases people's purchasing power. Investment instruments such as shares may also have an impact due to a decrease in the value of a security.

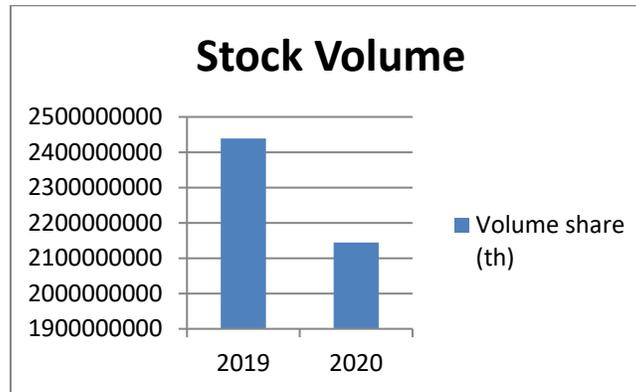


Figure 2. Stock Volume 2019 and 2020

Source: <https://www.idx.co.id>

The stock volume is one of the technical analysis that investor used if they want to trading. Based on Figure 2 we can see that the stock volume from 2019 to 2020 decreased by 12.1 %. The stock volume is one of potential technical factor that investor use to observing an opportunity. The decrease in the volume of stocks compared to that period indicates the appearance of the decrease in the purchasing power of the people or investor.

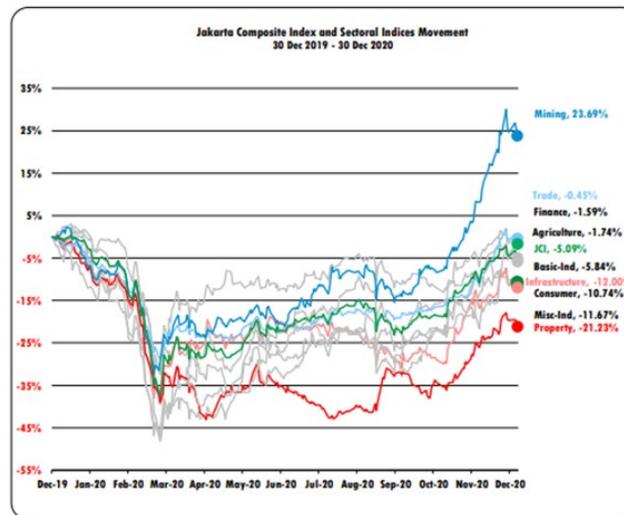


Figure 3. Growth Of Price Stock of Nine Sectors in 2020

Source: <https://www.idx.co.id>

Figure 3 shows the Jakarta Composite Index that derives its value from the stock prices of nine sectors of the Indonesian stock exchange. The chart above shows the growth of price stock for each sectors. It shows that in March 2020, the price stock of all nine sectors went down. The fact, that the combine of nine sector stoc price or Jakarta Stock Exchange Composite (JSKE) reached the lowest point with 4105 on March, 19 2020. But on this research the

most important is the growth of stock price in the mining sector is the highest of all, with 23.69%. For this reason, this study focuses on the mining sector.

2. Literature Review

The world has not experienced a single epidemic. Prior the COVID-19 pandemic, there were already a number of pandemics that also affected the country's economy and in particular capital market instruments such as price stocks. Here are some related studies about how the pandemic can affect stock prices:

The SARS pandemic affects many industries in Taiwan. The tourism sector is most impacted by the SARS pandemic. This is reinforced by the fall in stock prices in the tourism sector which reached 29% (Chen et al. 2007).

The stock indices of five countries: Indonesia, Singapore, Thailand, China, and Philipine. Based on their research, they found that China and Vietnam were the only countries that had a stock market impact during the SARS pandemic. but this result gets argued by many researchers because SARS tremendously has a negative affect toward many countries (Nippani and Washer 2004).

SARS pandemic has an obvious negative impact on economic activity. But they found that not all catastrophes produce negative effects on the stock market. It's Because the stock returns of biotechnology companies in Taiwan have been positively impacted during the SARS Pandemic (Chen et al. 2009). From research stock markets in Japan Taiwan, Hongkong China and Singapore for five years before and after the SARS virus became worldwide. They discovered that the pandemic could influence stock prices and create heterogeneous of investment opportunities, and make the risk environment of the international market increased inefficiency (Chen et al. 2018).

The Per capita income in exactly 10 Middle East countries such as Iran, Saudi Arabia, and Qatar decreased from 2012 to 2014 during MERS pandemic. As regards consumption, they found that changes in consumer attitudes will lead to changes in marketing channels (Ceylan & Ozkan 2020). During the MERS pandemic there is a change in consumer behavior in South Korea, particularly in the semi-luxury and electronics industries. growth in buying and selling activities in offline stores has declined about 7,9% , while for online stores has increased about 7,03% in South Korea (Jung & Sung 2017).

Investors overreacted to the significant bad news. And if it connected with a small part of the event like Ebola, they tend to withdraw their savings from the funds. Media gives such a big impact in here, the more articles on the Arab Spring and Ebola are published, the more withdrawals are made. It shows that Investors in African funds are highly aware of this kind of news: and it could influence investor way of behaving (Del Giudice & Paltrinieri 2017) .

During the Ebola outbreak on 2014-2016 the stock market was affected in West African countries and also affected the stock return of several companies. This is a more significant and statistically significant effect across the companies of the West African countries that are exposed, their operations in the US and Europe (Ichev & Marinč 2018). COVID-19 has reduced stock returns across all affected countries and increases their volatility, showing not only a larger influence on stock markets in Asia, but also an inevitable influence on those of non-Asia countries (H. Liu et al. 2020). International market gets affected especially in China and United States of America. investors seem to avoid China and US Stock at the beginning of Covid-19 pandemic (Ramelli & Wagner 2020).

In U.S, six out of eleven sector if industries had a significant impact on their stock prices during the pandemic of Covid-19. The stock price of energy sector companies is most affected by this pandemic (Sun 2020). In Indonesia, during pandemic Covid-19 the stock price changed significantly in food baverage sector company(Saputra et al. 2021). And also in the finance sector, the result of the comparative test said that the price stock has significantly changed during the sample period (Putri 2020). Technical analysis such as share price is not only the one thing that has changed significantly, but also the volume of share price has changed significantly (Angraini 2021).

3. Methods

Figure 4 shows the conceptual method that describe the research from the beginning until the strategy was made. The research is divided into 5 steps:

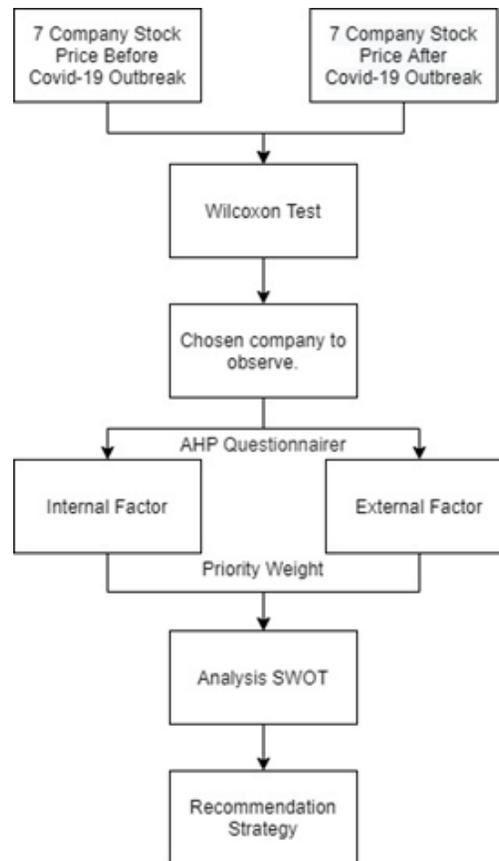


Figure 2. Method Conceptual

First, we collect daily stock market data on seven mining companies over one year prior to the Indonesian COVID-19 outbreak and one year following the Indonesian COVID-19 outbreak. And also We implemented a starting point in March 2020, which we assume to be the beginning COVID-19 start outbreak in Indonesia that month, accompanied by a first positive COVID-19 case in Indonesia on March 2nd, 2020. And after we collected the data, we used the Wilcoxon test to see if there was a relationship between stock prices before and after the Indonesian COVID-19 outbreak. Second, a company would be selected for observation by seeing its share price growth over the research period. Third, some questionnaires will be deployed in the company and will be filled out by the expert judgment. And the data would be processed by AHP method, and here's the step:

Develop a matched comparison matrix for Internal & External Factors

$$A = \begin{bmatrix} 1 & a_{12} & a_{1n} \\ a_{21} & \dots & a_{2n} \\ a_{n1} & a_{n2} & 1 \end{bmatrix} \quad (1)$$

Matrix A is usually called a pairwise comparison matrix that used to compare each matched variance to evaluate which of each variance gives better results. The $a_{ij} = 1$ when the element meets the same element. It will make diagonal matrix that separates the right side and the left side. The right side corresponds to the value of geomean that comes from the processed data of questionnaire. The left side is the comparison to the right side. $a_{ji} = 1/a_{ij}$ where $a_{ij} > 0, i \neq j$

Calculate the importances degree or priority vector.

$$w_i = \frac{(\prod_{j=1}^n a_{ij})^{1/n}}{\sum_{i=1}^n (\prod_{j=1}^n a_{ij})^{1/n}}, \quad i, j = 1, 2, \dots, n \quad (2)$$

To calculate priority vector we using normalization of geomean that we already have calculated before.
 Calculate consistency value (CV).

$$\begin{bmatrix} 1 & a_{12} & a_{1n} \\ a_{21} & \dots & a_{2n} \\ a_{n1} & a_{n2} & 1 \end{bmatrix} \cdot [w_1, \dots, w_n]^T = \begin{bmatrix} c_1 \\ \vdots \\ c_n \end{bmatrix} \quad (3)$$

Before we calculate the consistency value we should calculate each element's consistency where the value of consistency is multiplication between matrix A with the matrix transpose of priority vector that we have calculated before.

$$cv_i = \frac{c_i}{w_i}, \quad i = 1, 2, \dots, n \quad (4)$$

consistency value is the division of consistency by priority vector.

To avoid inconsistent results, Satty recommends using the λ_{max} eigen value to assess the effectiveness of the measure. λ_{max} can be calculate by:

$$\lambda_{max} = \frac{\sum_{i=1}^n CV_i}{n}, \quad i = 1, 2, \dots, n \quad (5)$$

λ_{max} is the division of total of consistency value by amount of element. And after that calculate consistency index that can calculate by:

$$CI = \frac{\lambda_{max} - n}{n - 1} \quad (6)$$

The last one is to calculate consistency ratio that can calculate by

$$CR = \frac{CI}{RI} \quad (7)$$

RI is a constant variable and the value of RI depends on the number of elements in the study. And here's the Table 1 below that shows RI value from each number of element data sample.

Table 1. RI Value

N	RI
3	0.52
4	0.88
5	1.11
6	1.25
7	1.34
8	1.41
9	1.45
10	1.48

Fourth, the data that is processed in AHP could be input into the swot analysis. Before the data is processed, Each element of the internal and external factor gets final calculated by multiplying each element (external & internal factor) or its priority factor with the rating.

After that, we calculate Internal Factor Analysis Strategy IFAS which comes from the subtraction between strength factor and weakness factor and also External Factor Analysis Strategy (EFAS) score which comes from the subtraction between opportunity factor and threat factor. If IFAS score positive the internal implementation factor of the strategy will concern on strength factor.If its negative, it will concern to weakness factor. And also if EFAS positive the external implementation factor of the strategy will concern on opportunity factor. If its negative, it will concern to threat factor.

Fifth, the type of integration strategy consists of four types there are Strength-Opportunity strategy, Strength-Threat strategy, Weakness-Opportunity strategy, Weakness-Threat strategy. The strategy that we make are depend on the result of IFAS and EFAS value.

4. Data Collection

The data collection stage is the stage where the data are collected and ready to be processed. In data collection there are two types of data that are collected, namely:

1. Primary Data

The main data or primary data is data that comes from the results of a questionnaire from expert judgment at the selected company. There are three expert judgment from the selected company that filled the questionnaire. The expert judgements are an employee who works in a selected company in financial accounting and some are in the strategy development division. And of course, before we get the data, we would first need to get permission from the selected company. The results of the questionnaire will processed by using AHP and SWOT analysis. After all of the data processing, the strategy for selected company will be made.

2. Secondary Data

Secondary data comes from stock price data of mining sector companies listed on the Indonesia Stock Exchange. The source of the price stock datas are from <https://www.investing.com> which provide a lot of data like technical and fundamental data from many company. There are seven company from metal and mineral mining sector that we observe their price stock. The stock price data collected started in one year before the Covid-19 outbreak in Indonesia (March 2019 – February 2020) and one year after the corona outbreak in Indonesia (April 2020 – March 2021).

5. Results and Discussion

5.1 Statistical Analysis

Based on Table 2, secondary data which is the price stock from seven company was processed through the Wilcoxon test. We can see that from seven samples of mining company that we process their price stock using Wilcoxon test, there just three company which price stock has significantly changed. Statistically, the sample titled changes significantly, it is because their p-value < 0.05. But if their p-value > 0.05, the result will be there is no significant change between the data sample.

Table 2. Wilcoxon Test Result

Comparisson	P-Value	Conclusion ($\alpha = 0,05$)
A 2 - A 1	0.53	ANTM 1 = ANTM 2
B 2 - B 1	0.05	DKFT 1 = DKFT 2
C 2 - C 1	0.034	INCO 1 \neq INCO 2
D 2 - D 1	0.002	MDKA 1 \neq MDKA 2
E 2 - E 1	0.158	PSAB 1 = MDKA 2
F 2 - F 1	0.875	TINS 1 = TINS 2
G 2 - G 1	0.002	ZINC 1 = ZINC 2

5.2 Data Analysis

Table 3 shows the growth of the price stock during the research period. Company A has been chosen to be a research focus and the final results are a strategy to sustain the company during the COVID-19 pandemic. Company A was chosen due to the most high value of difference in stock price growth before and after the outbreak of COVID-19 in Indonesia, at 1.00%.

Table 3. Growth Of 7 Companies Price Stock

COMPANY							
	A	B	C	D	E	F	G
1 year Before Covid outbreak In Indonesia	-0.21%	-0.26%	-0.14%	0.26%	0.04%	-0.30%	0.23%
1 year After Covid outbreak In Indonesia	0.80%	0.37%	0.38%	0.36%	0.07%	0.68%	0.20%
Difference	1.00%	0.63%	0.53%	0.11%	0.03%	0.99%	0.04%

Table 4. Pairwise Comparison Matrix

Internal Factor	CSP	DIM	EP	NP	RP	TAID	Priority vector
Commodity sales performance	1	1.71	0.48	0.69	1.44	0.84	0.16
Domestic & International Marketing	0.58	1	0.41	1.44	0.58	0.75	0.12
EPS Performance	2.08	2.47	1	0.82	0.58	2.47	0.22
NPM Performance	1.44	0.69	1.22	1	0.82	1.71	0.18
ROE Performance	0.69	1.71	1.71	1.22	1	1.71	0.21
Technology and information development	1.19	1.33	0.41	0.58	0.58	1	0.12
External factor	BOIR	I	GP	CISM	DETR	EG	Priority vector
Bank of Indonesia Rate	1	1.71	1.00	1.71	1.00	0.34	0.15
Inflation	0.58	1	0.91	1.00	0.58	0.64	0.11
Government Policy	1.00	1.10	1	0.58	0.52	1.00	0.14
Competitor in Stock Market	0.58	1.00	1.71	1	0.62	0.19	0.11
Dollar Exchange to Rupiah	1.00	1.71	1.91	1.61	1	0.28	0.16
Economic Growth	2.92	1.55	1.00	5.19	3.56	1	0.33

Table 4 shows pairwise comparison matrix from internal factor and external factor that came from processing data of primary data or questionnaire that filled by expert judgments. This matrix is one of the process of AHP method. And the result of this matrix is priority vector. The priority vector is an input for swot analysis and also with this matrix we could find consistency ratio.

Table 5. Consistency Ratio of Internal and External Factor

Factor	λ maks	CI	RI	CR
Internal Factor	6.26	0.05	1.24	0.04
External Factor	6.46	0.09	1.24	0.07

Based on Table 5 shows that both of internal factor and external factor has CS value below 0,1 which means, the AHP method produce the optimal solution. And this would be considered the data that generated by expert judgment through the questionnaire was not random.

Table 6. Final Score of Internal and External Factors

Internal Factor	Priority Vector	Rating	Final Score
Commodity sales performance	0.16	4	0.623
Domestic & International Marketing	0.12	3.3	0.405
EPS Performance	0.22	4	0.878
NPM Performance	0.18	3.7	0.646
ROE Performance	0.21	3	0.615
Technology and information development	0.12	3	0.366
External Factor	Priority Vector	Rating	Final Score
Bank of Indonesia Rate	0.15	3.7	0.535
Inflation	0.11	3	0.342
Government Policy	0.14	3	0.412
Competitor in Stock Market	0.11	3.7	0.406
Dollar Exchange to Rupiah	0.16	3.7	0.593
Economic Growth	0.33	3.7	1.212

From Table 6 presents the final score from internal and external factors which obtained from the multiplication between priority vector and rating. And it shows that from internal factor the EPS Performance factor has the highest score with 0.878. While from External factor the Economic Growth factor has the highest score with 1.212.

Table 7. IFAS and EFAS Score

Strength (S)	Internal Factor	Final Score
1	Commodity sales performance	0.623
2	Domestic & International Marketing	0.878
3	EPS Performance	0.646
4	NPM Performance	0.615
5	ROE Performance	0.366
	Subtotal 1	3.128
Weakness (W)	Internal Factor	Final Score
6	Technology and information development	0.405
	Subtotal 2	0.405

	IFAS Score	2.722
Opportunity (O)	External Factor	Final Score
1	Bank of Indonesia Rate	0.535
	Subtotal 1	0.535
Threat (T)	External Factor	Final Score
2	Inflation	0.342
3	Government Policy	0.412
4	Competitor in Stock Market	0.406
5	Dollar Exchange to Rupiah	0.593
6	Economic Growth	1.212
	Subtotal 2	2.964
	EFAS Score	-2.429

Table 7 shows IFAS and EFAS calculation. In IFAS, the result of subtraction between strength factor and weakness factor is 2.722. In EFAS, the result of subtraction between opportunity factor and threat factor is -2.429. According to the results of IFAS and EFAS, it can be concluded that the strategy to be developed is the ST Strategy. It because the result of IFAS score is positive and EFAS score is negative.

5.3 Graphical Analysis

Figure 5 presents the result of IFAS is 2.722 and its positive it would concerne on strength factor, and the result of EFAS is -2.429 and its negative it would concern on threat factor. IFAS is used as the coordinates of the x-axis and EFAS is used as the coordinates of the y-axis. The result of coordinate (2.722, -2.429) is in quadrant 2 which means strategy ST would be made on this research.

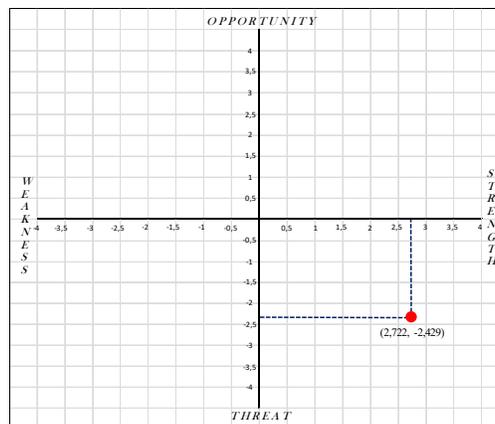


Figure 3. SWOT Diagram

5.4 Result

Based on Table 8, the strategies that have been made, From the combination strategy between internal and external factor should be related. And because all factors are related to the financial issue, all strategies focus on how

company can achieve more efficient financial benefits when faced with the threat of a pandemic. By making the strategy to avoiding threat, would make the company less likely to receive the risk and the significant impact of the risk as a result from the existing threat (Chumaidiyah et al. 2018).

Table 8. Integration Strategy

No.	Strength (S)	Threat (T)	Reccomendation Strategy
1	Commodity sales performance	Government Policy	Increase the portfolio of mineral resources Companies, especially gold resources & Increase Information technology development innovation.
2	EPS Perfomance	Economic Growth	Increasing company profits by cutting company expenses.
3	NPM Perfomance	Dollar Exchange to Rupiah	Strengthen the customer base in the domestic market, especially for gold commodities, according to the growth of domestic demand for gold.
4	ROE Perfomance	Inflation	Monitor equity and liability ratios and conduct selective capital expenditures.

6. Conclusion

Based on the result of Wilcoxon Test, From seven samples of company in mining sector there just three company which stock price gets affected during the sample period. And as the result of SWOT analysis, The strategy that we make is Strategy ST. This strategy is quite suited to the situation during this pandemic, which focuses on the strength of the company when there are many threats from outside the company that could affect the performance of company. But if we notice the beginning of the Covid-19 pandemic in March 2020, all stock prices for all sectors listed on the Indonesia Stock Exchange have declined. And the fluctuation of the stock price could be affected by many other aspects.

For further research, it's really important to examine the other sector that listed on Indonesia Stock Exchange. And it would be nice to see the other perspective based on another sampling period. There are also many more elements of internal and external factor that could be examine in this type of research. All of them obviously have an impact on improving the company's strategy.

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Biography

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