COVID-19, Green Innovation and Their Impacts on Financial Performance

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ABSTRACT

In the face of pandemics like COVID-19 today, environmental issues such as green innovation become very important, because companies with high levels of social and environmental awareness indicate that the companies are more resilient. This study aims to analyze the impact of COVID-19 and green innovation on financial performance. This study uses the Vector Error Correction Model (VECM) as a data analysis method and uses purposive sampling to get 48 samples with 336 observations. The results of this study indicate that COVID-19 has a significant negative impact on financial performance in the long and short term, managers ought to take note of the converting surroundings outside and adjust their commercial enterprise strategies in time. Meanwhile green innovation has a positive impact on financial performance in the long and short term. The implementation of green innovation activities affected the competitiveness and firm profits.

Keywords: COVID-19; Green Innovation; Financial Performance; VECM

COVID-19, Inovasi Hijau dan Dampaknya terhadap Kinerja Keuangan

ABSTRAK

Dalam menghadapi pandemi COVID-19 saat ini, isu lingkungan seperti inovasi hijau menjadi sangat penting, karena perusahaan dengan tingkat sosial dan kesadaran lingkungan yang tinggi berimbas pada ketangguhan perusahan tersebut. Penelitian ini bertujuan untuk menganalisis dampak COVID-19 dan inovasi hijau terhadap kinerja keuangan. Penelitian ini menggunakan Vector Error Correction Model (VECM) sebagai metode analisis data dan menggunakan purposive sampling untuk memperoleh 48 sampel dengan 336 observasi. Hasil penelitian ini menunjukkan bahwa COVID-19 memiliki dampak negatif yang signifikan terhadap kinerja keuangan dalam jangka panjang dan pendek, manajer harus memperhatikan setiap perubahan dan melakukan penyesuaian strategi perusahaan. Sedangkan inovasi hijau berdampak positif terhadap kinerja keuangan dalam jangka panjang dan pendek. Pelaksanaan kegiatan inovasi hijau mempengaruhi daya saing dan keuntungan perusahaan.

Kata Kunci: COVID-19; Inovasi Hijau; Kinerja Keuangan; VECM

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INTRODUCTION

Over the last three decades, global energy-related total CO2 emissions have continued to increase, with the exception of the 2009 financial crisis, when emissions fell by 1.3% (Haxhimusa & Liebensteiner, 2021). In early 2020, the unexpected COVID-19 pandemic swept the world. Since this COVID-19 outbreak in Wuhan, China, in December 2019, the virus has spread around the world, with the first infection in Europe being reported in Italy on January 21, 2020. Most countries have responded harshly to the spread of COVID-19. Restrictive measures, especially social distancing, reduced working hours and social lockdowns, have reduced economic activity, mobility and energy consumption, leading to collapse.

Due to the lockdown measures taken in many countries around the world due to COVID-19, many industrial and commercial activities have been closed along with quarantine measures. With study in detail the various environmental impacts caused by various industrial processes and pay particular attention to the conservation of the natural environment. Many reports say that despite the dire situation caused by COVID-19, the natural environment has benefited from the reduction or elimination of many sources of pollution, including industrial and commercial activities, and the suspension of transport operations (Elsaid et al., 2021). However, the economic impact of COVID-19 restrictions will be felt even more, with the first few months of 2020 responding to the outbreak of the global health crisis. A sudden financial crisis erupted across markets, and its impact was trending. Compared to the 2009 global financial crisis, which was about as high as the Great Depression of 1929-1933 (Broadstock et al., 2021).

The pandemic threatens the stability of nearly every market and the global economy. Markets are so interconnected across the globe that immediate and significant impacts were felt across the globe. On Monday, March 9, 2020, the panic of the COVID-19 pandemic and price wars between oil producers Saudi Arabia and Russia led to a significant drop in points in global markets. Dow Jones is down more than 2,000 points (-7.8%) and TSX is down its 1,661 points (-10.3%). The biggest drop since the pandemic was in October 1987 (Boshnak et al., 2021).

Central Bureau of Statistics data for 2020 shows that Indonesia's economic growth contracted from the fourth quarter of 2019 to the first quarter of 2020. According to Azizah (2021), household spending consumption was 2.71% in Q4 2019, but only 1.56% in Q1 2020. Indonesia's Finance Minister Sri Mulyani said the slowdown in Indonesia's economic growth in the first quarter of 2020 was due to working from home and physical distancing measures in some districts during the COVID-19 pandemic. This policy was put in place to curb the spread of this virus, resulting in a significant reduction in activity outside the home. Hidayat Amir, head of the Ministry of Finance's Macroeconomic and Fiscal Policy Department, said the economic loss from the COVID-19 epidemic was evident in Indonesia's economic growth in the first quarter of 2020, hitting a staggering 2.41%.

According to a study by Shen et al. (2020), the COVID-19 outbreak has had a significant negative impact on the performance of listed companies in China, lowering investment levels and total returns. In pandemic-affected sectors such as

tourism, hospitality and transportation, the company's production fell sharply in the first quarter of 2020.

Hu & Zhang (2021) have some findings. First, ROA for the company was negatively correlated with cumulative cases, suggesting that the company's average performance declined as cumulative cases increased. Efficiency is also important economically. Second, businesses operating in countries with better healthcare systems, better financial systems, and better governance can thrive during the pandemic. Ultimately, the increased uncertainty that accompanies the pandemic has put a significant strain on businesses in an environment of inescapable uncertainty.

On the other hand, Shahimi et al. (2021) showed that financially distressed firms' performance was not significantly affected by the pandemic. Given that these companies are already facing severe financial difficulties, it is not surprising that the social and economic restrictions imposed during the COVID-19 pandemic have been minimal. Serna & Guerra (2021) describe the firm's difficulties in accessing distribution channels, and Capital argues that the lack of product updates and the lack of business projections developed due to new market conditions is It's negatively impacting our business performance and is not a result of the pandemic.

In the face of pandemics like COVID-19 today, Yoo et al. (2021) found that environmental issues such as green innovation become very important, because companies with high levels of social and environmental awareness indicate that the companies are more resilient. Sachs et al. (2019) once said that environmentally conscious companies can become more sustainable with well-established organizations and systems. It therefore includes characteristics of a company's environmental, social, and financial governance performance. From a macroeconomic perspective, green companies or types of companies, especially green innovation and green finance, are particularly strong. Several governments around the world have enacted environmental regulations to encourage eco-innovation, reduce pollutant emissions and protect the environment (Li et al., 2020).

Green innovation is a new or modified method, practice, gadget, and production technique to reduce the effect of environmental harm. Green innovation is also defined as new technology (hardware or software) associated with products or manufacturing approaches on the way to cause energy performance, pollution discount, waste recycling, green product design and corporate environmental control (Agustia et al., 2019). A study by Xue et al. (2019) recognizes that green innovation practices are an important tool for developing sustainable practices. Scientists and strategists also believe that applying the concept of green innovation is the most important key to overcoming environmental uncertainty in today's business world. Stakeholders have expressed their views to pressure companies to adopt green innovation practices as a key mechanism for creating a coordinated approach to economic growth and increase environmental sustainability. Agustia et al. (2019) argue that the concept of green innovation is actually a hybrid of traditional innovation concepts aimed at increasing productivity and cost efficiency, improving products and opening up new market opportunities. Green innovation not only improves a

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company's economic performance, but also reduces its negative environmental impact and provides a competitive advantage. Another advantage of green innovation is that it encourages companies to transform their waste production into viable products that bring additional profits to the company.

According to Hu et al. (2021), companies are seen as driving sustainability, but many companies show apathy towards green innovation. This is due to various side effects that are characteristic of green innovations. First, when a company brings new technology or environmentally friendly products to the market, the relative lack of intellectual property protection prevents the company from winning innovation awards, and motivation decreases for further innovation. Second, there are side effects due to contaminant intrusion. This is due to an unhealthy market pricing system, and companies often overpay for pollutants and disposal costs. Green innovation strategies are often costly and risky, leading companies to implement green innovations less often than others (Hu et al., 2021)). Furthermore, companies in developing countries have different cultural and socio-political aspects from companies in developed countries that focus on green innovation, and research on green innovation is more advanced than in developing countries (Fadlilah et al., 2021).

A study by Xue et al. (2019) provides evidence of positive correlations between green innovation and aspects of corporate performance. A company's ability to seek and apply external information plays an important role in its growth and sustainability. Research and development (R&D) activities generate fresh knowledge and new ideas from external sources . This allows the company to expand its internal knowledge and technology portfolio and reduce the costs associated with implementing and maintaining green innovation processes in the company's organization. With their newfound ability to absorb information value, companies therefore have the opportunity to reap significant benefits from their green innovation activities by filtering and applying it for powerful commercial purposes. Lin et al. (2019) argue that green innovation has a positive impact on firms' financial performance. By implementing green innovation activities, the company's financial performance is improved, its reputation as a company is enhanced, and social responsibility is more emphasized. Also, positive green innovators will attract more customers and further expand the market share of all companies. By adopting environmentally friendly innovation activities, companies can increase productivity, avoid environmental protests and fines, enhance their corporate reputation, enter new markets, develop an image related to environmental awareness.

A study by Ramadhany et al. (2021) shows that green innovation has a significant positive impact on financial performance. This shows that the better a company's green innovation, the better its financial performance. Sales are more likely to increase when a company is seen as environmentally responsible. Investments in environmental remediation increase the sustainability burden of businesses and society, improving financial performance in the short term. This statement is consistent with stakeholder theories that green business impacts profit growth.

In contrast, according to Duque-Grisales et al. (2020) eco-friendly innovations do not have a significant impact on financial performance. Developed

countries have strong institutional incentives to motivate companies to apply for certification to implement green innovations, but the informational context for decision-making is limited by ineffective corporate governance, strong Information asymmetries, weak or inadequate regulatory and legal frameworks.
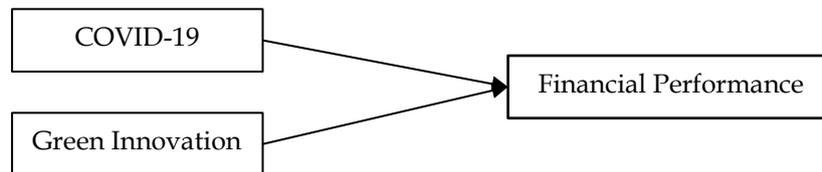
Figure 1. Theoretical Framework
Sources: Sekaran & Uma, 2016

The basic theory used in this research is stakeholder theory. According to stakeholder theory, the company considers its stakeholder relationships, especially the needs and desires of companies that have available resources for the company's operations, must be maintained. The stronger the influence of stakeholders, the greater the company's commitment to adapt. Based on stakeholder theory, companies choose to voluntarily disclose information about social and environmental performance, more comprehensive information about company activities and their impact on social and ecological conditions (Andrian, 2020).

According to Devi et al. (2020), this economic crisis will undoubtedly lead to lower sales in the industrial sector due to lower purchasing power. If sales in the industrial sector decline due to the economic crisis caused by the spread of the new coronavirus, there is no doubt that it will affect the financial situation of the company as a whole. During the crisis, the company's profitability fell sharply as its net profit declined sharply due to the weakening of people's purchasing power and the increase in interest costs. When people's purchasing power declines, it will certainly affect sales for the company. As a company's sales decline, so does its profit if the associated operating costs cannot be minimized. Osayantin et al. (2020) stated that COVID-19 had a significant impact on financial performance, as there were significant differences in financial performance before and after the COVID-19 outbreak. The first hypothesis proposed is.
H_1: COVID-19 has negative impact on financial performance.

According to Ma et al. (2021), green innovation can impact a company's financial performance in the following ways: (1) Reduce costs. Raw material costs can be reduced through product design changes and the use of recycled materials. Developing environmentally friendly processes can reduce the cost of contaminant management later in the business. (2) Increase income. Companies can reach more markets by developing eco-friendly products. The use of green technology can improve a company's image, increase the company's attractiveness in the capital markets, and increase the company's funding. This is consistent with a study by Wang et al. (2021) and Yi et al. (2021) report that green innovation is positively correlated with financial performance. The second hypothesis proposed is.
H_2: Green innovation has positive impact on financial performance.

Furthermore, this study aims to analyze the impact of COVID-19 and green innovation on financial performance. Academically, this research can be a

reference for subsequent research that has similar topics. In practice, this research can be a reference for the Government in preparing strategic steps in overcoming the COVID-19 pandemic outbreak and for companies this research can be used as a basis for making strategic decisions in innovating.

The novelty in this study lies in in the combination of the two variables Covid-19 and green innovation in one study and the object of research which uses data from non-financial companies listed on the Indonesia Stock Exchange in all sectors and uses the *Vector Error Correction Model* (VECM) analysis method. The uniqueness in this study can be seen the long-term relationship between variables using cointegration tests.

RESEARCH METHODS

This study uses a quantitative descriptive approach to test the proposed hypothesis. A survey was conducted on the annual financial statements/annual reports/sustainability reports of all companies listed on the Indonesian Stock Exchange. The study population includes all non-financial companies listed on the Indonesian Stock Exchange for the period 2015-2021, up to 672 companies (as of 27 August 2022). The selection of non-financial firms as the population in this study is due to the fact that non-financial firms have more direct contact with and impact the environment through their business activities than financial firms (Apriliana, 2019).

After screening against two criteria, this research using sampling technique to obtain a sample of 48 firms or 336 observations. The first criteria, company that publish a complete financial statement/annual report/sustainability report on the Indonesian Stock Exchange from 2015 to 2021. Second, companies that received a gold, green and blue rating because of due diligence by the Ministry of Environment and Forestry of the Republic of Indonesia.

The data used is secondary data in the form of financial statements/annual reports/sustainability reports from companies listed on the Indonesia Stock Exchange selected as a sample. The data analysis method used is the *Vector Error Correction Model* (VECM) with the help of E-Views 9 software. There are several stages in using VECM, namely data stationarity test, optimal lag length test, model stability test, cointegration test, granger causality test, VECM empirical model, *Impulse Response Function* (IRF) analysis and *Forecast Error Variance Decomposition* (FEVD) analysis. As for the general model of VECM as follows.

$$Y_t = \alpha + \sum \beta_{1i} Y_{t-1} + \sum Y_i X_{1t-1} + \varepsilon_t \dots\dots\dots\dots (1)$$

Notes:
$Y = Dependent\ variable$
$X = Independent\ variable\ (1, 2, \dots)$
$\alpha = Constant$
$\beta = Coefficient$
$\sum = Sigma/total$
$i = Individual$
$\varepsilon = Error$
$t = Current\ period$
$t - 1 = Prior\ period$

The dependent variable used in this study is return on assets (ROA). Lu et al., (2021) concluded that this indicator can reflect the company's overall financial performance, and its high or low value can directly reflect the company's financial situation, is objective, has universal characteristics and is easy to understand. The ROA formula is as follows.

$$ROA = \frac{Net\ income}{Total\ assets} \dots\dots\dots\dots\dots\dots\dots (2)$$

There were two independent variables used in this study. The first independent variable used in this study is COVID-19 using a dummy variable, where the number 0 is used to indicate the year before the COVID-19 pandemic occurred and the number 1 is used to indicate the year that was hit by the COVID-19 pandemic (Shahimi et al., 2021). Second, green innovations are measured using scores based on 12 indicators or assessment *items* which will then be quantified into the form of a ratio according to the research of Duque-Grisales et al. (2020), with the maximum score being 12 and the minimum score being 0. The following is the calculation formula for green innovation obtained from the research of Agustia et al., (2019).

$$GI = \frac{Total\ green\ innovation\ score}{Overall\ score} \times 100\% \dots\dots\dots\dots\dots\dots (3)$$

A hypothetical decision basis for this study is a comparison of the t-statistic and the t-table. If the t-statistic is greater than the t-table, either the independent variable has a large influence on the dependent variable or H1/H2 is accepted. On the other hand, if the t-statistic is lower than the t-table, the independent variable has no significant effect on the dependent variable or H1/H2 is discarded. Based on the number of samples and variables in this study (48 and 3, respectively), we can obtain 45 degrees of freedom with a t-table of 2.01410 at the 5% significance level.

RESULT AND DISCUSSION

Before proceeding to the VECM stage, it can be seen in table 1 below which contains a chronology of sample selection.

Table 1. Sample selection chronology

Sample Criterion	Amount
All non-financial companies listed on the Indonesian Stock Exchange for the period 2015-2021	672
Companies that do not publish complete financial/annual reports/sustainability reports from 2015 to 2021	(54)
Companies that do not receive a gold, green or blue rating from the Ministry of Environment and Forestry PROPER award	(570)
Total Sample Selected	48
Observation years	7
Number of observations during 2015-2021	336

Source: Data Research, 2022

Based on Table 1, it is known that the number of non-financial companies listed on the Indonesia Stock Exchange during 2015 to 2021 were 672 companies accessed on 27 August 2022. From the sampling technique used, 54 companies did not have complete data in publishing financial statements/annual/sustainability period from 2015 to 2021 and 570 companies that did not achieve a gold, green or blue rating in the PROPER award, bringing the number of research samples

obtained to 48 companies with 336 observations. Furthermore, there is a descriptive analysis that can be seen in Table 2.

Table 2. Descriptive Statistics

Variables	N	Minimum	Maximum	Mean	Std. Deviation
ROA	336	-0.375	0.921	0.070	0.107
COVID	336	0.000	1.000	0.286	0.452
GI	336	0.000	0.667	0.147	0.159

Source: Data Research, 2022

Based on Table 2, it can be seen that ROA has a minimum, maximum, average and standard deviation of -0.375, 0.921, 0.070 and 0.107, respectively. COVID has a minimum, maximum, mean and standard deviation of 0, 1, 0.286 and 0.4524, respectively. The GI has a minimum, maximum, mean and standard deviation of 0, 0.667, 0.147 and 0.159, respectively. This means that the data is heterogeneous due to the spread of data that varies so that it has a low level of deviation. Next are the results of the data stationarity test using the Augmented Dickey-Fuller test.

Table 3. Stationarity Test

Variables	Level	Probability
ROA	1st difference	0.000
COVID	1st difference	0.000
GI	1st difference	0.000

Source: Data Research, 2022

In this study, the Augmented Dickey-Fuller test (ADF) was used for data stationarity testing. If the data has a unit root, the values tend to fluctuate instead of being centered around the mean, making model estimation difficult. (Basuki & Prawoto, 2016). From Table 3, it can be seen that all the variables used in this study were stationary at the first difference level. The next stage is testing the optimum lag length.

Table 4. Optimum Lag Length Test

Lag	LR	FPE	AIC	SC	HQ
8	53.937*	6.821*	-5.686*	-4.817*	-5.339*

Source: Data Research, 2022

Determination of the amount of lag can be determined based on the Likelihood Ratio (LR) criteria, Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC) and Hannan-Quinn Information Criterion (HQ). Optimum lag length testing is very useful for eliminating autocorrelation problems in VECM systems. Based on Table 4, all the criteria for selecting the eighth lag to be used in the VECM system. The next step is to test the stability of the VECM model.

Table 5. Stability Model Test

Root	Modulus
0.035 - 0.565i	0.566
0.035 + 0.565i	0.566
-0.261 - 0.404i	0.481
-0.261 + 0.404i	0.481
-0.057 - 0.395i	0.399
-0.057 + 0.395i	0.399

Source: Data Research, 2022

If the VECM model is not stable, IRF and FEVD are invalidated, so the stability of the model should be tested first before further analysis. If the modulus values of all roots are less than 1, the model basis is said to be stable. Based on Table 5, it can be concluded that the VECM model in this study is valid because all roots have a modulus value lower than 1. The next step is the cointegration test.

Table 6. Cointegration Test

Rank Test (Trace)		
Hypothesized No. of CE (s)	Critical Value	Trace Statistic
None	29.797	128.258
At most 1	15.495	44.187
At most 2	3.841	20.512
Rank Test (Max-Eigen)		
Hypothesized No. of CE (s)	Critical Value	Trace Statistic
None	21.132	84.071
At most 1	14.265	23.675
At most 2	3.841	20.512

Source: Data Research, 2022

This study uses the Johansen Trace Statistics test to test the cointegration of the data. The purpose of this test is to determine whether there is a long-term relationship with the variables under investigation. Once cointegration is proven, VECM can continue. However, if it is not detected, VECM cannot continue. The test criterion for cointegration in this study is based on trace statistics. If the statistical trace values exceed the 5% critical value, we can conclude the cointegration of these variables. From Table 6, we can conclude that there is evidence of cointegration for the variables used. This is indicated by the sum of the trace statistics being greater than the critical value. The next stage is the granger causality test.

Table 7. Granger Causality Test

Null Hypothesis:	F-Statistic	Probability
COVID does not Granger Cause ROA	2.700	0.007
ROA does not Granger Cause COVID	0.219	0.988
GI does not Granger Cause ROA	2.197	0.029
ROA does not Granger Cause GI	0.678	0.711
GI does not Granger Cause COVID	1.110	0.356
COVID does not Granger Cause GI	1.175	1.214

Source: Data Research, 2022

Granger causality test is used to see whether or not there is a reciprocal relationship between variables. Based on Table 7, it can be seen that there is no relationship between the variables used in this study. There is only a one-way relationship, namely COVID and GI are related to ROA. The next step is to estimate the VECM empirical model.

Table 8. The result of VECM estimation

Variables	Long-term	Short-term
	t-statistics	t-statistics
COVID	-14.626	-2.809
GI	2.104	2.018

Source: Data Research, 2022

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Based on Table 8, it can be seen that in the long and short term, COVID has t-statistics of -14.626 and -2.809, respectively. The t-statistic is greater than the t-table of 2.014 so that H1 is accepted, meaning that COVID has significant negative impact on ROA in the long and short term. This shows that when the COVID-19 pandemic occurs, financial performance will decline as a result of very fast transmission and prevention efforts through various restrictions. If the COVID-19 pandemic cannot be resolved immediately, the Indonesian economy will gradually weaken due to decreased income obtained through tax revenue from the real sectors affected. When the real sectors that absorb the most labor are no longer able to operate, the impact will decrease people's income. The decline in people's income due to the economic crisis during the COVID-19 pandemic will certainly impact the decrease in people's purchasing power so that sales activity in the industrial sector will also decrease. The decline in sales value in the industrial sector will certainly impact lowering profits and a decrease in cash inflows (Devi et al., 2020).

The transmission and rate of spread of COVID-19 is so fast that the number of infections doubled in less than three days, causing great fear among populations around the world. According to Rababah *et al*. (2020) infection rates coupled with fears of causing supply shocks in the industry as the government sets policies to limit operational activities to protect workers and avoid possible spread of the COVID-19 virus. The results of this study are in accordance with Devi et al., (2020) and Osayantin et al. (2020) which state that COVID-19 influences financial performance.

Shen et al. (2020) mentioned that the pandemic had a negative impact on production, operations, and sales of companies, which was ultimately reflected in negative rates of return. Regionally, local companies are experiencing a much more pronounced negative impact as strict quarantine measures restrict consumption and production, sending negative signals to their managers and stakeholders. Financial constraints can make operations even more difficult in times of COVID-19.

Spoz et al. (2021) added that in today's global economic realities, companies must be able to manage resources effectively and adapt quickly to changes in the business environment. A company must be able to accurately assess the company's situation, its market position and predict future developments within the organization and its environment.

In terms of dealing with COVID-19, the Government can make policies to provide benefits for companies that contribute and collaborate in handling COVID-19. Meanwhile, the Company can assist the Government in preventing and tracking the spread of COVID-19 by providing facilities and infrastructure for COVID-19 tests and strengthening health protocols.

In addition, based on table 8, it can be seen that in the long and short term, GI has t-statistics of 2.104 and 2.018, respectively. The t-statistic is greater than the t-table of 2.014 so that H2 is accepted, meaning that GI has a significant positive impact on ROA in the long term and short term. This shows that when companies implement green innovation, it will have an impact on financial performance which will increase. The results of this study are in line with Ma et al. (2021), Wang et al. (2021) and Yi et al. (2021) which states that green innovation has a positive

effect on financial performance. This result is in accordance with stakeholder theory, where social and environmental disclosures are considered as part of the dialogue between companies and their stakeholders. Disclosure of information can be a medium of communication between companies and their stakeholders, because business owners know more about business operations than other stakeholders. Investors continuously evaluate relevant information, motivating companies to voluntarily disclose information to access valuable resources.

Stakeholder theory exhibits that the company will tell all varieties of duty for activities finished associated with the environment. Financial performance is an essential indicator for traders in measuring the achievement of a employer. green innovation of the company's efforts to reduce terrible affects on the environment. Traders assume returns on their investments. Return is received if the company can produce true performance. Environmental overall performance by way of corporates to keep away from protests or environmental consequences, increase productiveness, decorate company recognition, foster green awareness, broaden new markets, and attain competitive benefit first mover. When the business enterprise is considered to have environmental responsibility, the opportunity to increase income is more open. Investment in environmental improvement will upload burden to the agency and network sustainability within the quick term even as growing economic performance (Ramadhany et al., 2021).

Ma *et al*. (2021) stated that voluntary disclosure of environmental information is a useful tool to improve financial performance of all companies, including green innovation and non-green innovation. When companies are considered to have environmental responsibility, opportunities to increase revenue are more open (Ramadhany et al., 2021).

Yi et al. (2021) finds that implementing green innovation can help companies with a strong commitment to achieving a sustainable competitive advantage in today's dynamic environment to achieve a greener future, especially in terms of financial performance. Yi et al. (2021) said innovation could allow it to outperform its competitors. A company's resources are also a key component of achieving a sustainable competitive advantage. Allocating resources to green innovation is critical to profitability as it puts more demand on dynamic capabilities than other aspects of the business.

Wang et al. (2021) added that consumers may be more willing to spend money in companies that implement green innovations because of their increased awareness of environmental protection, so that it can better reflect the sustainability of the company's performance. From the perspective of the social environment, green innovation can not only sustain economic growth, but also reduce resource consumption and environmental pollution.

Companies can increase low carbon awareness publications. Through green innovation, enterprises can achieve sustainable development and avoid the risks posed by climate change. Companies can reduce their carbon emission statistics by changing their environmental accounting policies. Therefore, the government should gradually build an integrated carbon emission disclosure system and implement green innovation by developing standardized and integrated accounting policies.

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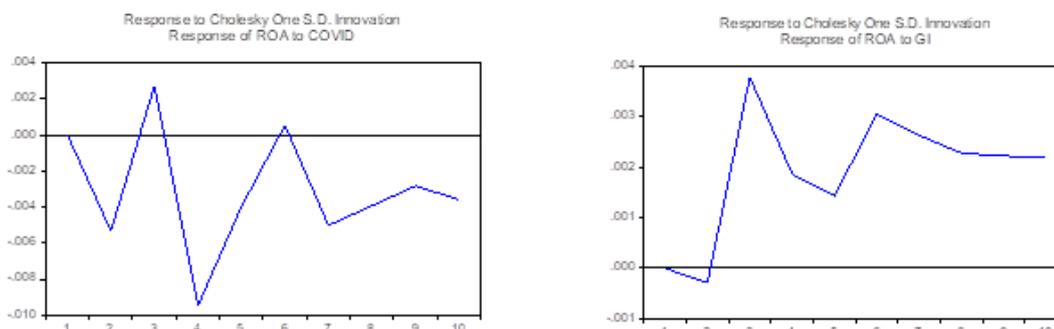
Figure 2. Impulse Response Function

Source: Data Research, 2022

IRF analysis will explain the impact of shocks on one variable on another variable, which in this analysis displays in the short term and long term for several time horizons in the future and can provide an overview of how long the influence lasts. Based on figure 2, the COVID-19 shock caused financial performance as proxied by ROA to fluctuate and tend to decline. This can happen if the current COVID-19 pandemic is not handled properly, resulting in a very sharp risk of uncertainty.

Furthermore, the existence of a green innovation shock as proxied by GI causes financial performance as proxied by ROA to tend to increase, although in the second period it experienced a slight decline. This further strengthens that the application of green innovation has a good impact on financial performance and leads to the sustainability of the company.

Table 9. Forecast Error Variance Decomposition

	Variance Decomposition of ROA:			
Period	S.E.	ROA	COVID	GI
1	0.088	100.000	0.000	0.000
2	0.101	99.941	0.030	0.029
3	0.111	99.673	0.163	0.164
4	0.119	99.663	0.163	0.174
5	0.124	99.655	0.157	0.188
6	0.129	99.607	0.162	0.231
7	0.135	99.326	0.411	0.263
8	0.139	99.200	0.412	0.388
9	0.145	99.008	0.390	0.602
10	0.151	99.026	0.366	0.608

Source: Data Research, 2022

Forecast Error Variance Decomposition aims to measure the contribution or composition of each independent variable to the dependent variable. Based on table 9, it can be seen that GI which represents green innovation has a greater contribution than COVID-19 to ROA which represents financial performance.

CONCLUSION

Based on the estimated results of the VECM model, we find that COVID-19 is having a negative impact on financial performance in both the long and short term. The COVID-19 has a bad impact on the manufacturing, operation, and sales of the industries, that's finally contemplated in the negative return rate. Along the local size, the terrible impact is lots extra suggested in excessive-affected regions as strict

quarantine measures limit consumptions and productions, sending a poor sign to managers and its stakeholders. Economic constraints might also make the operation even tougher within the COVID-19. Managers ought to take note of the converting surroundings outside and adjust their commercial enterprise strategies in time. it's far critical to make the manufacturing and operation meet the consumption trend of "post-pandemic span," to promptly restore the operation. The government should take steps to promote financial stability in Indonesia. Increase the number of SME beneficiaries, implement more intensive socialization related to COVID-19 risk and prevention of COVID-19, as well as providing relief to issuers who have loans so that industry performance can improve through lowering interest rates or credit restructuring. Green innovation, on the other hand, has a positive impact on financial performance in both the short and long term. The implementation of green innovation activities affected the competitiveness and firm profits. The managers can resolve many environmental management problems during the strategic planning stage and develop better environmental green innovation for integrating the ecological activities in their business operations. The managers ought to perceive the ecological problems and put into effect environmental modern activities for addressing those issues. The managers need to apprehend the manner wherein the environmental incentive applications can be accomplished, which would help them promote the sustainable improvement of the green processes and products. The environmental innovation can assist the firms obtain a waste reduction or elimination, healing of sources and dematerialisation and reuse of sources.

Furthermore, the limitation in this study lies in the COVID-19 data which only uses a dummy variable and is still within the scope of a public company in Indonesia. This is due to data limitations and access to more extensive data. Further researchers can use data on suspected COVID-19 cases and expand the scope of research to ASEAN. In addition, further researchers can use different data analysis methods such as Panel Data Regression or Vector Autoregression so that they can enrich similar research and make insights more dynamic. It is also necessary to expand the research period and sample companies in order to obtain more dynamic data.

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