

**The Moderation Role of Financial Performance in the Relationship Between Green Innovation and Firm value (Empirical Study of Manufacturing Companies in 2020-2021)****Gugus Darmajati Setyawan<sup>1\*</sup>, Rita Wijayanti<sup>1</sup>**<sup>1</sup>Universitas Muhammadiyah Surakarta

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**\*Email:** [B200190451@student.ums.ac.id](mailto:B200190451@student.ums.ac.id)**ABSTRACT**

This study aims to analyze the moderating role of financial performance in the relationship between green innovation and firm value in manufacturing companies. The population of this study is 192 manufacturing companies that issue annual reports, do not bear any losses during the year of study, and are listed on the Indonesia Stock Exchange (IDX) for the period 2020 to 2021. The sample model used in this study is purposive sampling. The data analysis technique used in this research is descriptive statistical analysis, classical assumption test and moderate regression analysis (MRA). The results of the study show that green innovation has a significant effect on firm value. ROA and ROE financial performance have a significant effect on firm value. ROA's financial performance is able to moderate between green innovation and company value. Meanwhile, ROE's financial performance is not able to moderate between green innovation and firm value.

**Keywords:** Firm value, Financial Performance, Green Innovation.

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**INTRODUCTION**

Environmental issues are one of the many important topics included in the discussion of the global economy today. Entering the industrial era 4.0, the company's growth continues to increase every day, this is not balanced with an adequate waste management process, resulting in a lot of industrial waste being disposed of immediately without being recycled. As a result of this, soil and water pollution occurs around the company environment and within the community. Lately, there have been many demands and pressures coming from within and outside the company to use a more environmentally friendly system in all of its business activities. From the demands and pressures that come to the company, the company is currently changing its perspective not only to be profit-oriented, but to think about other perspectives that are capable of maintaining its business.

Green Innovation or green innovation has a concept that is not much different from conventional innovation concepts, which aim to improve a product to increase productivity, cost efficiency, open new market opportunities, improve company performance economically, reduce negative impacts on the environment and create competitive advantages for companies. and encourage companies to process waste production into products that can generate additional profits for a the company (Agustia et al., 2019).

Green innovation is how companies can reduce the negative impact of their operations on the natural environment (Chen et al., 2018). Green innovation is an environmental strategy that involves transformation in production procedures, which consists of reducing resource consumption, preventing pollution, and implementing environmental management systems in business operations (Asadi et al., 2020). The definition of green innovation refers to products, processes or management practices that aim to reduce environmental impact. Green innovation also takes its philosophical roots from the theory of sustainable development, which signifies the relationship between an organization's operations and its impact on the natural environment (Cancino et al., 2018). The main focus of green innovation is reducing waste, preventing pollution, and implementing systems that focus on environmental management (Eiadat et al., 2008). A company is said to have carried out a green innovation if it has introduced or developed a new product that increases energy savings, better pollution prevention, recycles more waste, or reduces the use of raw materials during the previous three years (Roper & Tapinos, 2016).

Green Innovation can be an opportunity for companies to continue their creation and development activities while maintaining natural carrying capacity. This innovation is able to increase firm value through efficient use of raw materials and energy, creation of new markets, utilization of existing company shares and product competitive advantages so as to increase profit margins which will make a major contribution to economic performance.

Firm value is the investor's perception of the company's success. For a companies that have gone public, the value of the company can be reflected through the company's stock price, while for companies that have not gone public, value can be seen through the realized value of the company's assets when the company will be established. Sold. High firm value will make the market not only believe in the company's current performance but also in the future (Agustia, Sawarjuwono, and Dianawati 2019).

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Firm value in this study is measured using Tobin's Q. According to Lang (1989) quoted in (Sudiyatno and Puspitasari 2010) Tobin's Q is used as a measure of company performance, which shows management performance in managing company assets. Tobin's Q shows the condition of the company's investment opportunities. The ratio value in this study is known from the stock market value and debt market value compared to the total value of capital placed on production assets, so Tobin's Q can be used as a measure of company performance which can be seen from the market value of a company. hypothesis development

High levels of productivity and innovation within a company can help achieve and maintain the value of the company itself. one of the keys for a company to create a competitive advantage if it is done regularly and applied to the company's own business processes. However, there is a debate about improving environmental performance will reduce shareholder value which will have an impact on firm value. This is because the cost of companies to comply with ethical standards by implementing green innovation will result in higher cost of goods which will put the company in a disadvantaged position. profitable in the industry and decrease shareholder wealth.

The main goal of the company is not just to create value for shareholders, but to create value for all stakeholders. High firm value will attract investors to invest in the company. However, in the process of achieving its goals, companies often face conflicts when reconciling economic and environmental goals. Creating value for all stakeholders requires managers to improve financial, social and environmental performance and ensure that the company remains sustainable in the future. According to legitimacy theory (O'Donovan, 2002), a company can continue to survive (sustainable) if it can adapt its business processes to the rules or norms that apply in society.

High levels of productivity and regular innovation definitely help companies achieve and maintain corporate value. Not only economic and social performance, environmental performance is an aspect that is considered by stakeholders. Green Innovation is one of the keys for companies to achieve their goals, especially for companies in a high level of competition and an unstable environment. Green innovation can become a competitive advantage for companies if it is carried out regularly and applied to all business processes. Innovation creates value for both new and established companies (Rosenbusch et al., 2013). Green Innovation improves company performance through increasing market share or through reducing operational costs (Özyahin et al., 2013). Green Innovation improves company performance through efficient use of raw materials and energy, creation of new market shares and product competitive advantages (Ar, 2012). In addition, Green Innovation can also be used as a unique tool for marketing activities to continuously increase market share (Küçüköylü and Pınar). So that the first hypothesis can be formulated:

H1 : Green innovation has a positive effect on firm value

If investors want to see how much return a company can generate on their investment, they first look at profitability ratios, known as ROA and ROE, which measure how efficiently a company generates returns for investors. The higher the ratio, the greater the company's profit value, which in turn can be a positive sign that investors are getting a return on their investment. The rate of return earned speaks volumes about how well a company is valued in the eyes of investors. If the company succeeds in proving that if the profit margin

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is large, it will encourage investors to invest in these shares, which will increase the share price and demand for these shares. The second hypothesis can be formulated that:

H2.a. :Return on assets has a positive effect on firm value.

H2.b. :Return on equity has a positive effect on firm value.

As previously mentioned, the role of financial performance as a moderation uses two main indicators in this study, namely return on assets (ROA) and return on equity (ROE). Due to green innovation, these two indicators are often used interchangeably in some previous studies. The green innovation strategy has an impact on the economic value of the company. Empirically, several studies provide evidence that adoption of green innovation by companies committed to environmental regulation has a positive impact on profitability (eg Hojnik et al., 2017; Christmann, 2000; Klingenberg et al., 2013; Cheng et al., 2014; Lia, 2018; Tariq et al., 2019; Alos-Simodkk., 2020). Green innovation policies implemented by management in various forms, including product, process and organizational innovation, will drive sales growth in the company (Xiedkk., 2019; Cheng et al., 2014; de Oliveira Brasil et al., 2016); Alos-Simodkk., 2020), which will drive firm value (Sorescu and Spanjol, 2008; Agustiadkk., 2019). Investors positively evaluate companies that implement green policies as innovations that create competitive advantage (Sorescu and Spanjol, 2008; Pujari, 2006; Misra, 2017; Agustiadkk., 2019). For the third hypothesis it can be concluded:

H3.a. : Return on assets has a positive effect on the relationship between green innovation and firm value.

H3.b. : Return on equity has a positive effect on the relationship between green innovation and firm value.

**METHOD**

This type of research is descriptive research with a quantitative approach. The population of this research is 192 manufacturing companies in the consumer goods sector, various industries, and basic and chemical industries which are listed on the Indonesia Stock Exchange (IDX) for the period 2020 to 2021. The sample model used in this research is purposive sampling. The criteria for a selecting the sample in this study are:

1. Companies listed on the IDX during 2020-2021.
2. IDX companies that issue annual reports for 2020-2021 consecutively.
3. Companies that do not experience losses during 2020-2021.
4. All data needed in calculating the variables in this study are available.

The variables used in this study are :

1. Dependen Variable

The dependent variable in this study is firm value (FV). FV is measured by comparing the market value of a company's assets to its total assets, using the Tobin's Q ratio.

Tobins'Q : 
$$\frac{(\text{Outstanding share} \times \text{Stock price}) + (\text{Debt} + \text{Inventory}) - \text{Current assets}}{\text{Total asset}}$$

2. Independent Variable

The independent variable in this study is green innovation (GI). Referring to the research by Xie et al. (2019), each measurement item related to the production process and product is given a score ranging from 0 to 2 with the criterion "0" meaning that there is no description of the item indicators, "1" means that there is a simple description without implementation details (for example detailed plans or implementation process related to

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green innovation), and “2” means there is a related detailed description (e.g. numerical indicators, product/process innovation type to describe the suitable practice environment). By making a total for each item and deriving the item average as the final data representing the GI, the measurement is used :

1. Aims to reduce the use of natural resources, water and energy and increase the efficiency of these resources.
2. Utilizing recycled materials, recycling techniques, and environmental technology
3. Setting up environmental campaigns.
4. Use/adapt equipment/technology to reduce energy, water, and waste.
5. Modify product design to prevent contamination or hazardous substances in the production process.
6. Improve and develop eco-friendly packaging for old and new technology products.
7. Create or modify product designs to improve energy efficiency during use.
8. This product uses less polluting or harmful materials.

### 3. Moderation Variable

In this study financial performance (FP) is used as a moderator variable to examine the relationship between green innovation and firm value. FP is measured using ROA and ROE.

$$ROA = \frac{\text{Earning After Tax}}{\text{Total Asset}}$$

$$ROE = \frac{\text{Earning After Tax}}{\text{Total equity}}$$

### 4. Control Variables

Several control variables were included to increase the accuracy of the findings and avoid the influence of other variables in this study, namely:

1. Age is the age of the company, measured by the number of years the company has been established. operating, that is, since the company was founded.
2. Size is the size of the company, measured using the natural logarithm of total assets.
3. Ownership is company ownership, measured using a dummy variable, “0” if the company has foreign ownership status and “1” if the company has domestic ownership status.

The data analysis method used in this study consisted of descriptive statistics, classic assumption tests (normality test, multicollinearity test, autocorrelation test, and heteroscedasticity test), hypothesis testing (F test, t test and coefficient of determination), and Moderated Regression Analysis (MRA). ) with models:

1. Moderation model stage 1

$$FV = \alpha + \beta_1GI + \beta_2COMPANY\ SIZE + \beta_3Umur + \beta_4Kepemilikan + e \dots\dots\dots(1)$$

2. Moderation model stage 2

$$FV = \alpha + \beta_1GI + \beta_2GIROA + \beta_3GIROE + \beta_4COMPANY\ SIZE + \beta_5Umur + \beta_6Kepemilikan + e \dots\dots\dots(2)$$

FV = Firm value  $\alpha$  = Constant  $\beta$  = Coefficient of independent variable GI = Green Innovation COMPANY SIZE = Natural Log Age = Firm Age Ownership = Domestic or foreign ownership Financial Performance = Moderation e = Error

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### RESULT AND DISSCUSION

#### Classic assumption test

The following is the result of testing the classical assumptions from the data used in this study:

**Table 1.** Classical Assumption Test Results

Test	Parameter	Precondition	Decision
Normality	Central Limit Theorem	(154) > 30	Normal distribution
Multicolinierity	Tolerance & VIF	Tolerance > 0,10, VIF > 10	Multicollinearity free
Heteroscedasticity	Variable Significance	> 0,05	Heteroscedasticity free
Autocorrelation	Asymp. Sig. (2-tailed)	0,196 > 0,05	Autocorrelation free

**Source:** Author's compilation

Based on the results of the classical assumption test that has been used, it appears that this study is free from the classical assumptions, namely normality, multicollinearity, heteroscedasticity and autocorrelation. Therefore, this study is considered as BLUE.

#### Moderation Test 1

The following are the results of the moderation test 1 in this study:

**Table 2.** Moderation Test Results 1

Variable	Coefficients	Sig. t	Sig F	Adjusted R Square
Konstanta	1767583,322	0,001	0,020	0,050
Company size	-38683,339	0,323		
Umur	-8371,110	0,081		
Kepemilikan	-187779,478	0,372		
GI	702843,772	0,014		

**Source:** Author's compilation

Based on the results of the regression analysis above, the regression model obtained is as follows:

$$FV = 1767583,322 + -38683,339 \text{ COMPANY SIZE} + -8371,110 \text{ UMUR} + -187779,478 \text{ KEPEMILIKAN} + 702843,772 \text{ GI}$$

From the regression results can be interpreted as follows:

- A constant value of 1767583,322 indicates that if Company size, age, ownership, gi are constant, the firm value (FV) will increase by 1767583,322 .
- The Company size regression coefficient is -38683,339, which means that if Company size increases by 1, the firm value (FV) increases by -38683,339. The significance value obtained was  $0.323 > 0.05$  so that the natural log partially had no effect on firm value (FV).
- The regression coefficient value of the AGE variable is -8371,110 with a negative sign. This shows that when the AGE variable increases by 1, the firm value variable (FV) will

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- decrease by -8371,110. The significance value obtained was  $0.081 > 0.05$  so that the age of the company partially did not affect firm value (FV).
- d. OWNERSHIP regression coefficient value of -187779,478 means that if the firm value (FV) increases by 1, then the firm value increases by -187779,478 The significance value obtained was  $0.372 < 0.05$  so that company ownership partially affects firm value (FV).
  - e. The regression coefficient value of GI is 702843,772 which means that if GI increases by 1, the firm value (FV) increases by 702843,772. The significance value obtained is  $0.014 < 0.05$  so that green innovation partially affects firm value (FV).
  - f. The calculated F value is 3,022 and a significance of 0,020. So it can be said that the regression model above is appropriate to use to predict the relationship between green innovation and firm value.
  - g. The adjusted R square value of 0,050 (5%) can be interpreted that the role or contribution of natural logs, age, ownership, and green innovation can explain the variable firm value (FV) of 5% while the remaining 95% explained by other variables outside the model.

### Moderation Test 2

The following are the results of the moderation test 2 in this study:

**Table 3.** Moderation Test Results 2

Variable	Coefficients	Sig. t	Sig F	Adjusted R Square
Konstanta	1126100,213	0,001	0,000	0,650
ROA	6516589,248	0,000		
ROE	-1514477,466	0,029		
COMPANY SIZE	-20513,412	0,393		
UMUR	-7018,235	0,017		
KEPEMILIKAN	-122804,806	0,337		
GI	-187745,194	0,415		
GIROA	14047198,71	0,014		
GIROE	2326483,501	0,567		

**Source:** Author's compilation

Based on the results of the regression analysis above, the regression model obtained is as follows:

$$FV = 1126100,213 + 6516589,248 \text{ ROA} + -1514477,466 \text{ ROE} + -20513,412 \text{ COMPANY SIZE} + -7018,235 \text{ UMUR} + -122804,806 \text{ KEPEMILIKAN} + -187745,194 \text{ GI} + 14047198,71 \text{ GIROA} + 2326483,501 \text{ GIROE}$$

- a. A constant value of 1126100.213 indicates that if the independent and moderating variables are not constant, the firm value (FV) will decrease by 1126100.213.
- b. The ROA regression coefficient value is 6516589.248 which means that if ROA increases by 1, then firm value (FV) increases by 6516589.248 assuming the independent variables and other moderation are constant. The significance value obtained is  $0.000 < 0.05$  so that the ROA of the company partially affects the firm value (FV).
- c. The ROE regression coefficient is -1514477,466 with a negative sign meaning that if ROE increases by 1, then the firm value variable (FV) will decrease by -1514477,466 assuming the independent variables and moderation are constant. The significance value obtained is  $0.029 < 0.05$  so that the ROE of the company partially affects the firm value (FV).

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- d. The COMPANY SIZE regression coefficient is -20513,412 with a negative sign meaning that if COMPANY SIZE increases by 1, then the firm value variable (FV) will decrease by -20513,412 assuming the independent variables and moderation are constant. The significance value obtained is  $0.393 < 0.05$  so that partial COMPANY SIZE has no effect on firm value (FV).
- e. The regression coefficient value of AGE is -7018.235 with a negative sign meaning that if AGE increases by 1, then the firm value variable (FV) will decrease by -7018.235 assuming the independent variables and moderation are constant. The significance value obtained is  $0.017 < 0.05$  so that the age of the company partially affects the firm value (FV).
- f. OWNERSHIP's regression coefficient value is -122804.806 with a negative sign meaning that if OWNERSHIP increases by 1, then the firm value variable (FV) will decrease by -122804.806 assuming the independent variables and moderation are constant. The significance value obtained is  $0.337 > 0.05$  so that partial company ownership has no effect on firm value (FV).
- g. The GI regression coefficient is -187745.194 with a negative sign meaning that if GI increases by 1, then the firm value variable (FV) will decrease by -187745.194 assuming the independent variables and moderation are constant. The significance value obtained was  $0.415 > 0.05$  so that green innovation partially had no effect on firm value (FV).
- h. The regression coefficient value of the GI variable with financial performance (GIROA) is 14047198.71. This shows that when the GI\_ROA variable increases by 1, then the firm value variable (FV). will increase by 14047198.71 assuming all independent and moderating variables are constant. The significance value obtained is  $0.014 < 0.05$  so that financial performance is able to moderate between green innovation variables and firm value (FV).
- i. The regression coefficient value of the GI variable with financial performance (GI\_ROE) is 2326483.501 with a negative sign. This shows that when the GI\_ROE variable increases by 1, the firm value variable (FV) will decrease by 2326483.501 assuming all independent and moderation variables are constant. The significance value obtained was  $0.567 > 0.05$  so that financial performance was unable to moderate between the green innovation variable and firm value (FV).
- j. The calculated F value is 36.567 with a significance level of 0.000. Because the significance probability is  $< 0.005$ , the regression model can be used to predict firm value (FV) or it can be said that financial performance is able to moderate the green innovation variable so that it affects firm value (FV).
- k. Adjusted R Square value of 0.650. This means 65% of the variation in firm value (FV) which can be explained by the independent variables COMPANY SIZE, AGE, OWNERSHIP, & GI which are moderated by Financial Performance. While the remaining 35% is explained by other variables outside the model.

**DISCUSSION****The Effect of Green Innovation on Firm values**

The first hypothesis test is aimed at testing the effect of Green Innovation on firm value. It is known that the t statistic value is 2.493 and the significance value is 0.014 which is less than the significance level of 0.05. From the statistical results, it can be concluded

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that the Green Innovation variable affects the value of companies listed on the IDX for the 2020-2021 period.

The results of this study are in line with research conducted by Agustia, D. (2019). That a high level of productivity and regular innovation can certainly help companies to achieve and maintain corporate value. Not only economic and social performance, environmental performance is an aspect that is considered by stakeholders.

**The Effect of Financial Performance on Firm Value**

Testing the second hypothesis aims to test the effect of financial performance proxied by Return On Assets (ROA) & Return On Equity (ROE) on company value. It is known that ROA has a t statistic value of 4.238 with a significance value of 0.000 which is less than the significance level of 0.05. Meanwhile ROE also has a t statistic value of -2.205 with a significance value of 0.029 which is smaller than the 0.05 significance level. From the statistical results it can be concluded that financial performance influences firm value.

The results of this study are supported by research conducted by Yuniarti, R., & Soewarno, N. (2022), that financial performance can increase firm value indicating the company's effectiveness in generating profit levels from managing its assets. Investors' assessment of financial performance will affect the sustainability of the company in the future.

**The Effect of Financial Performance as a Moderator of the Relationship Between Green Innovation and Firm Value**

Testing the third hypothesis aims to examine the role of financial performance proxied by Return On Assets (ROA) & Return On Equity (ROE) whether it can moderate the relationship between Green Innovation and firm value. The GIROA output results show that the statistical value of t is 2.485 with a significance of 0.014. And the GIROE output results show that the statistical value of t is 0.574 with a significance of 0.567. Based on the statistical results, it can be identified through the GIROA & GIROE coefficients that the GIROA coefficient is declared significant and the GIROE coefficient is not statistically significant. This means that the moderating variable of financial performance only acts as a predictor variable in the established relationship model.

The results of this study are in line with research conducted by Khusnah, H., Mardiyah Anugraini, V. P. F., & Putra, R. S. (2021). shows that financial performance partially moderates the effect of green innovation on firm value. The application of green innovation is cost-effective because it can save energy and prevent pollution, so that it can improve the company's financial performance. When the company's financial performance increases, the value of the company will also increase

**IMPLICATIONS**

The results of this study have implications that companies need to pay attention to green innovation in carrying out their activity processes. This is because green innovation greatly impacts the value of the company. In addition, financial performance also needs to be considered so that the company's value can continue to increase, so that the company can be eyed by investors and become a sustainable company.

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**CONCLUSION**

This study aims to determine whether the role of financial performance as a moderation influences the relationship between green innovation and firm value. The sample model used in this research is purposive sampling. The data analysis technique used in this study is descriptive statistical analysis, classical assumption test and regression moderation analysis (MRA). Based on the discussion, the conclusion of this study is that green innovation has a significant effect on the firm value of companies listed on the Indonesia Stock Exchange in 2020-2021, Financial Performance ROA & ROE has a significant effect on firm value in companies listed on the Indonesia Stock Exchange in 2020-2021, Performance ROA Finance is able to moderate green innovation on firm value and ROE Financial Performance is not able to moderate green innovation on firm value in companies listed on the Indonesia Stock Exchange 2020-2021. It is hoped that further research will add variables to the research in order to be able to describe as a whole what factors can affect firm value. In this study, the company samples taken were only limited to companies listed on the Indonesia Stock Exchange for the 2020-2021 period, so it was feared that they would not be able to show the population properly. Therefore, for further research, it is better to increase the number of research samples so that the data produced is more accurate and can represent all companies in Indonesia.

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