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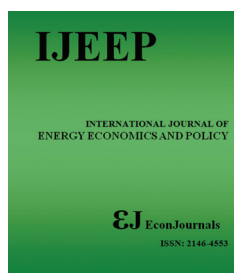
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The Role of Environmental Management Accounting in Mediating Green Innovation to Firm Value: Moderated by Quality Management

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ABSTRACT

Firm value is an important indicator for increasing the competitiveness of a company amidst very tight business competition. This research aims to obtain empirical evidence regarding the influence of Green Innovation on Firm Value which is mediated Environmental Management Accounting (EMA) and moderated by Quality Management. The companies that are the object of this research are manufacturing companies listed on the Indonesia Stock Exchange for the 2020–2022 period. The sampling technique in this research used a purposive sampling method and obtained 65 companies. The multicollinearity test and heteroscedasticity test are used as classical assumption tests. Eviews 12 software with panel data regression analysis was used to test the hypothesis. Based on the research results, it was found that green innovation, EMA, green innovation has an influence on Firm Value, EMA has an influence in mediating the relationship between green innovation and Firm Value and quality management can moderate the relationship between green innovation and Firm Value.

Keywords: Firm Value, Green Innovation, Environmental Management Accounting, Quality Management

JEL Classifications: G32, Q56

1. INTRODUCTION

Firm Value is an important indicator for increasing the competitiveness of a company amidst very tight business competition. This research aims to obtain empirical evidence regarding the influence of Green Innovation on Firm Value which is mediated by EMA and moderated by Quality Management. The companies that are the object of this research are manufacturing companies listed on the Indonesia Stock Exchange (BEI) for the 2020–2022 period. The sampling technique in this research used a purposive sampling method and obtained 65 companies. The multicollinearity test and heteroscedasticity test are used as classical assumption tests. Eviews 12 software with panel data regression analysis was used to test the hypothesis. Based on the

research results, it was found that green innovation, EMA, green innovation has an influence on Firm Value, EMA has an influence in mediating the relationship between green innovation and Firm Value and quality management can moderate the relationship between green innovation and Firm Value.

The relationship between green innovation and Firm Value has varied results, several studies have found that green innovation requires quite large investments and innovation involves knowledge and resources that require companies to communicate closely with suppliers, customers and investors so that green innovation takes a long time to develop. Make it happen (Yao et al., 2019). Companies require large costs for their operations so companies prefer operational activities that ultimately do not

affect Firm Value (Husnaini and Tjahjadi, 2021). Meanwhile, other research finds that green innovation strategies can improve operating modes, reduce production costs, and improve company reputation, thereby bringing significant improvements in social and financial performance (Banerjee, 2001). Green innovation is one of the keys for companies to achieve their goals, especially for companies that are at a high level of competition and an unstable environment, so that green innovation can increase Firm Value through production process efficiency and can become a competitive advantage for companies if carried out regularly. And applied to the entire business process (Mariyamah and Handayani, 2020; Dewi and Rahmianingsih, 2020). Even though there is no guarantee of certainty regarding the results obtained, the many benefits of innovation that can be obtained will be far more valuable than the costs incurred (Agustia et al., 2019), so that investor interest will focus on the company because they believe that the company is focused on environmental sustainability in the future (Yuniarti et al., 2022). However, creating environmentally friendly innovation is not an easy job, to make it happen requires quite a lot of money and companies need accurate, detailed and relevant information so EMA needs to be implemented.

The relationship between Quality Management in supporting green innovation which has an impact on Firm Value has mixed results. Husnaini and Tjahjadi (2021) revealed that implementing ISO 9001 requires quite a large investment and ISO is considered a company image, so investors react negatively for this reason. Quality management practices focus on improving processes by eliminating waste and gaining efficiency so that quality management practices are not compatible with innovation and this has an impact on reducing the resources needed to foster innovation (Sadikoglu and Zehir, 2010). In the quality management philosophy, companies are advised to carry out continuous improvement aimed at simplifying processes (Zeng et al., 2015) but continuous improvement hinders increased innovation because it focuses on gradual change, requiring standardization to establish control, stability and routine (Sahoo, 2019). Quality management facilitates innovation but only in a limited way (Thai Hoang et al., 2006) and (Martínez-Costa and Martínez-Lorente, 2008) convince that the implementation of quality management tends to create more harm to innovation than support which impacts on reducing Firm Value. Quality management is considered the key to determining the company's value in the future, where industrial companies can create environmentally friendly performance by developing quality management in the innovation process. This can improve financial performance, especially when quality management is viewed holistically as a common practice that interacts with each other. Related, namely including top management leadership, employee management, customer focus, supplier management, process management, quality data and reporting (Augustyn et al., 2021; Zhou and Li, 2020). The implementation of ISO 9001 directly shows an increase in operational performance and has influenced market performance and business performance in both the private and public sectors (Augustyn et al., 2021; Kumar et al., 2018). Adopting quality management standards allows companies to more efficiently perform their operations in terms of inventory

turnover ratio (Lo et al., 2009) and thus generate high returns (Siougle et al., 2019) so as to encourage the implementation of innovation with the aim of increasing Firm Value.

Referring to research conducted by Yuniarti et al. (2022) which suggests using different measurements of green innovation, this research applies measurements carried out by Agustia et al. (2019), Damas and Tarisa (2022) using the Green Innovation Checklist The index and object carried out are by using a manufacturing company. This is because according to environmental problems it is mainly caused by manufacturing companies and because manufacturing has a big impact on sustainable and environmentally friendly economic growth (Lin, H, Zeng 2017). Apart from that, manufacturing companies have a high level of innovation in their products and processes (Husnaini and Tjahjadi, 2021). The concepts of EMA and Quality Management in previous research were more often carried out in primary rather than secondary research, which was measured using survey questions given to accountants or company managers such as the research conducted (Effendi, 2021; Falih Chichan et al., 2021; Sahoo, 2019; Zhou and Li, 2020). This research places more emphasis on external factors in testing Firm Value, while previous research focuses more on internal factors such as Return on Assets (ROA) or Return on Equity (ROE).

2. LITERATURE REVIEW

A theory can be interpreted as a series of interconnected concepts that serve to systematically and in-depth describe an issue or event. A systematic description explains variables and aims to describe and explain the phenomenon.

2.1. Stakeholder Theory

Stakeholder theory was first initiated by R. Edward Freeman in 1984. The assumptions of stakeholder theory are built on the basis of the statement that companies that are growing rapidly cause society to become very connected and pay attention to the company, so that companies need to show accountability and responsibility more broadly and not limited to just to shareholders, but companies must also be responsible in the social realm. This happens because of demands from society as a result of negative externalities that arise and social inequality that occurs. Thus, the company's survival depends on Ghozali's stakeholder support according to Gray et al. (1994) in Ghozali and Chariri (2007). Stakeholder theory has developed along with an organization's approach when carrying out its operational activities. According to Budimanta et al. (2008) there are two forms of approach regarding stakeholders, namely old corporate relations and new corporate relations. Based on stakeholder theory, EMA can be a control to reduce the company's impact on the company's operational environment and to provide information to stakeholders, where in this theory the company must be responsible to shareholders and stakeholders so that management must be able to show good performance to the parties involved. Interests related to financial performance and environmental performance. So EMA can bridge the gap between a company's economic and environmental performance by clearly revealing hidden environmental costs.

2.2. Legitimacy Theory

The legitimacy theory explains how a company carries out its operating activities continuously in accordance with the norms and values that apply in society (Spence, 1973) argues that legitimacy is a company management system that is oriented towards taking sides with the community (society), the environment, government, individuals, and community groups. According to Dura and Purnaningsih, 2018.

Legitimacy is important for organizations, boundaries are imposed by social norms and values, and reactions to these limits encourage the importance of analyzing organizational behavior with respect to the environment. According to Sari (2013) the legitimacy theory is a company activity that is limited by a corporate social contract that reports its social activities will be recognized and accepted by the community. According to Sari (2013), legitimacy theory states that an organization can only survive if the community around the organization believe that the organization operates based on a value system compatible with those owned by the community. According to Suchman's system of standards, values, beliefs, and definitions (2015), legitimacy can be considered as an entity's efforts to convince various parties that the actions that have been taken are needed, appropriate or in accordance with those standards.

2.3. Signal Theory

Signal theory was first introduced by Spence (1973). This theory was also put forward by Ross (1977) that company executives will have better information and tend to provide this information to potential investors. According to Brigham (2006) Signal theory is a company theory which states how a company must be able to provide something to stakeholders or vice versa as an action that must be taken to describe the company's future which can convey information to potential investors in making decisions. Based on signal theory, green innovation is a company's effort to get a good response from stakeholders, considering the surrounding environmental conditions which force companies to utilize environmental resources as efficiently as possible. This effort will be a positive signal for stakeholders so that it will encourage investors to invest and increase the value of the company. While companies use EMA to get positive signals from external parties, the results of EMA are expected to provide transparent information for investors because EMA is believed to be able to manage the costs incurred with balanced environmental management (Harymawan et al., 2020).

2.4. The Value of the Company

Firm Value is a condition that the company has achieved as a sign of public's trust in the company. High corporate value is an achievement for the company because it can bring prosperity and profitability for shareholders and make the market believe not only in the company's performance but also in future prospects. Investors believe that the value of the company is an important concept that the market uses as an indicator to judge the company as a whole.

Firm value, which is closely related to Rizka's share price (2019), is an investor's perception of the company's level of success. If a company were to be sold, its value would be determined by

the sale price that potential purchasers would be prepared to make, according to Husnan (2000). The company's goal is to pay attention to the welfare of the owner of the company by optimizing the value of the company.

2.5. Green Innovation

Innovation can be interpreted as thinking about innovative new ideas in activities that produce new goods, implementing new processes, or establishing new companies because companies will not exist for long if they do not innovate in their operations (Wong, 2012). The concept of green innovation is not much different from the concept of conventional innovation which aims to improve a product to increase productivity, cost efficiency and also open up new market opportunities. Meanwhile, green innovation not only aims to improve company performance economically, but also to reduce negative impacts on the environment and create competitive advantages for companies (Agustia et al., 2019).

2.6. Environmental Management Accounting (EMA)

EMA according to the International Federation of Accounting (2005) is environmental management and economic performance through the development and implementation of accounting systems related to the environment and its practices appropriately. EMA can increase stakeholder satisfaction (Kong et al., 2022). This is because companies with high environmental performance can maintain long-term financial and social benefits in addition to decision-making capabilities. This supports stakeholder theory which states that stakeholders do not only assess companies through the profits they generate, but also from how the company has good environmental management and is balanced with its economic value. So that stakeholders support companies that have implemented EMA in terms of maximizing costs because EMA can bridge the company's economy and its environment (Agustia et al., 2019).

2.7. Quality Management

Quality management is a series of processes used to ensure that a company's products and services meet required standards, this process helps organizations achieve their goals by managing and improving the quality of products and services. Quality management is a system implemented to help organizations, companies or business entities to increase performance, productivity and cost efficiency, by continuously improving production processes and technology and improving the quality of products and services (Husnaini and Tjahjadi, 2021). This is to ensure that the organization, product or service consistently functions well. Quality management practices are one of the important requirements in achieving company goals by satisfying consumers in local and international markets (Ali and Mimeche, 2014). The QM philosophy emphasizes continuously improving performance to meet the challenges of relentless competition in the market (Sahoo, 2019).

3. RESEARCH METHODOLOGY

3.1. Research Approach

This study uses quantitative data, descriptive and associative research to describe whether events are true or false and to explain

the relationship between the variables studied by interpreting data collected, processed, analyzed, and presented. We can conclude that this study was intended to do so hypothesis. This study examines the causal relationship of each variable, including independent, dependent, and moderating variables. In addition, this research was conducted through a causal comparative study.

3.2. Place and Time of Research

This study uses secondary data through online downloading the Annual Report and Sustainability Reports of Manufacturing Companies listed on the IDX in the period 2020 – 2022 via the internet. The downloaded data is of course data that has been published on the Indonesia Stock Exchange website.

3.3. Research Variables

There are several variables in this research, namely the dependent, mediating and moderating variables, including the dependent on firm value, the mediating variable is EMA and the last moderating variable is Quality Management. Table 1 below provides an explanation of the operational definitions of the variables used in the research.

3.4. Sampling Method

In this study, not all of the research population will be the object of research, so sampling techniques must be carried out. This research uses non-probability sampling technique and purposive sampling method. Purposive sampling is a method of determining the sample by using certain criteria and reviews as the data source.

3.5. Data Retrieval Method

This study uses secondary data, annual report data and sustainability report data that researchers indirectly obtained from the official website www.idx.co.id which has been published by the Indonesia Stock Exchange.

3.6. Data Analysis Method

Panel data regression analysis method is commonly used in quantitative data analysis with the help of software Eviews version 12. Panel data regression analysis is also useful in knowing the whether relationship between the dependent and the independent variable is negative or positive and estimating

the value of the dependent variable which is influenced by the magnitude of the increase or decrease of the independent variable.

1. Descriptive Statistics Test

The mean standard deviation, maximum and minimum analysis were the analysis tool used. Descriptive statistics provide a very important numerical measure for sample data. The Eviews 12 program was used to conduct descriptive statistical tests.

2. Estimation of Panel Data Regression

To estimate the regression model using panel data, it is necessary to go through 3 strategies that can be used, and they are as follows:

a. Common Effects Model (CEM)

$$Y_{it} = \beta_0 + \sum_{k=1}^n \beta_k X_{kit} + \varepsilon_{it}$$

b. Fixed Effects Model (FEM)

$$Y_{it} = \beta_{0it} + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \varepsilon_{it}$$

c. Random Effects Model (REM)

$$Y_{it} = \beta_{0it} + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \varepsilon_{it}$$

3. Selection of Panel Data Estimation Model Techniques

The following is a test scheme in determining the panel data regression model to be used in panel data regression analysis (Figure 1).

Figure 1: Panel data regression model selection scheme

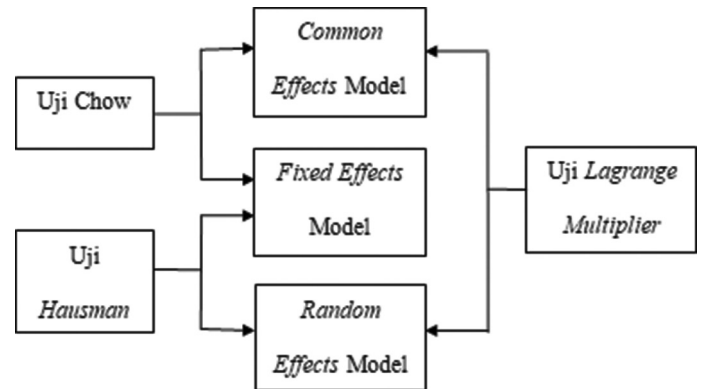


Table 1: Operational definition

No	Variables	Definition	Measurements	Scale
1.	The value of the company	Firm value is an investor's perception of value where this is often associated with the company's stock price.	$\text{Tobin'SQ} = \frac{\text{TMV} + \text{D}}{\text{TA}}$	Ratio
2.	Green Innovation	Concept for evaluating a company's environmental sustainability in an effort to improve economic, organizational and environmental efficiency.	Checklist index based on 8 indicators	Ratio
3.	Environmental Management Accounting	The concepts of environmental management and economic performance are used to assess company operations and bridge interests caused by the company's environment and economy.	$\text{Eco - efficiency} = \frac{\text{Product value}}{\text{Environmental influences}}$	Ratio
4.	Quality Management	The company's ability and processes to maintain the quality of the products or services offered	International standards ISO 9001 and ISO 45000	Nominal

4. RESEARCH RESULTS AND DISCUSSION

4.1. Description of Research Object

This is a type of quantitative research that performs statistical testing of secondary data. Based on the criteria that have been set in sampling, this study uses a sample of Manufacturing companies in Indonesia from 2020 to 2022. From the information above, 416 manufacturing companies that will be used as data sources for analysis are obtained. The selection process used is as follow in Table 2.

Based on the sampling criteria above, it can be seen that 65 companies can be sampled during the observation period. A total of 195 data were collected over the 4-year research observation period (from 2020 to 2022). The summary of the general description of the company is as follows in Table 3.

Table 2: Sample selection criteria

No	Criteria	Total
1.	Manufacturing Companies listed on the Indonesia Stock Exchange for the 2020-2022 period	416
2.	Manufacturing Companies that are delisted or inconsistently listed on the Indonesian Stock Exchange for the 2020–2022 period	(10)
3.	Manufacturing companies that do not consistently publish financial reports or Annual Reports for the 2020–2022 research period	(79)
4.	Manufacturing Companies that do not have a Sustainability Report separately or included in the Annual report for the 2020–2022 period	(262)
Total Sample Company		65
Research period (years)		3
Number of Research Data Samples		195

Table 3: Company sample list

No	Code	Company name	No	Code	Company name
1	INTP	PT. Indocement Tungal Prakasa Tbk	36	ISSP	PT. Steel Pipe Industry of Indones
2	SMCB	PT. Solusi Bangun Indonesia Tbk	37	SQMI	PT. Wilton Makmur Indonesia Tbk
3	SMGR	PT. Semen Indonesia (Persero) Tbk	38	TRST	PT. Trias Sentosa Tbk.
4	WSBP	PT. Waskita Beton Precast Tbk	39	BISI	PT. BISI International Tbk.
5	WTON	PT. Wijaya Karya Beton Tbk	40	CPIN	PT. Charoen Pokphand Indonesia Tbk
6	TPIA	PT. Chandra Asri Petrochemical	41	CSRA	PT. Cisadane Sawit Raya Tbk.
7	JPFA	PT. Japfa Comfeed Indonesia Tbk	42	DMND	PT. Diamond Food Indonesia Tbk
8	INKP	PT. Indah Kiat Pulp and Paper Tbk	43	DSNG	PT. Dharma Satya Nusantara Tbk
9	INRU	PT. Toba Pulp Lestari Tbk	44	EPMT	PT. Enseval Putera Megatrading Tbk
10	TKIM	PT. Pabrik Kertas Tjiwi Kimia Tbk	45	MPMX	PT. Mitra Pinasthika Mustika Tbk
11	ASII	PT. Astra International Tbk	46	SMSM	PT. Selamat Sempurna Tbk
12	AUTO	PT. Astra Otoparts Tbk	47	SONA	PT. Sona Topas Tourism Industry Tb
13	MLBI	PT. Multi Bintang Indonesia Tbk	48	ABMM	PT. ABM Investama Tbk.
14	UNVR	PT. Unilever Indonesia Tbk	49	AMFG	PT. Asahimas Flat Glass Tbk.
15	INAI	PT. Indal Aluminium Industry Tbk	50	AMIN	PT. Ateliers Mecaniques D Indonesi
16	BRPT	PT. Barito Pasific Tbk	51	ARNA	PT. Arwana Citramulia Tbk.
17	IMPC	PT. Impack Pratama Industri Tbk	52	BHIT	PT. MNC Asia Holding Tbk.
18	PBRX	PT. Pan Brothers Tbk	53	BMTR	PT. Global Mediacom Tbk.
19	WIIM	PT. Wismilak Inti Makmur Tbk	54	BNBR	PT. Bakrie and Brothers Tbk
20	GGRP	PT. Gunung Raja Paksi Tbk	55	ANTM	PT. Aneka Tambang Tbk.
21	APII	PT. Arita Prima Indonesia Tbk	56	KAYU	PT. Darmi Bersaudara Tbk.
22	ASGR	PT. Astra Graphia Tbk	57	LTLS	PT. Lautan Luas Tbk.
23	UNTR	PT. United Tractors Tbk	58	HERO	PT. Hero Supermarket Tbk.
24	BRMS	PT. Bumi Resources Minerals Tbk	59	MGRO	PT. Mahkota Group Tbk.
25	INCO	PT. Vale Indonesia Tbk	60	SIMP	PT. Salim Ivomas Pratama Tbk
26	MDKA	PT. Merdeka Copper Gold Tbk	61	BRAM	PT. Indo Kordsa Tbk
27	TINS	PT. Timah Tbk	62	SCMA	PT. Surya Citra Media Tbk.
28	AALI	PT. Astra Agro Lestari Tbk	63	TRIS	PT. Trisula International Tbk.
29	ANJT	PT. Austindo Nusantara Jaya Tbk	64	WOOD	PT. Integra Indocabinet Tbk.
30	BWPT	PT. Eagle High Plantations Tbk	65	ZONE	PT. Mega Perintis Tbk.
31	LSIIP	PT. PP London Sumatra Indonesia Tbk			
32	SMAR	PT. Smart Tbk.			
33	SSMS	PT. Sawit Sumbermas Sarana Tbk			
34	ACES	PT. Ace Hardware Indonesia Tbk			
35	IGAR	PT. Champion Pacific Indonesia Tbk			

4.2. Data Calculation

Based on the results of the tests that have been carried out and described above, the following conclusions can be drawn (Table 4).

Based on the selection results, the best model has been carried out previously. For the Path Model analysis of Equation 1, the best model that can be used is the Random Effect Model using the GLS method, Equation 2 and Moderation. The best model that can be used is the Fixed Effect model using the GLS method. The GLS (Generalized Least Square) method was chosen in this research because of the added value that GLS has compared to OLS in estimating regression parameters, GLS parameters are more efficient and stable than OLS parameters.

Based on the test results of the two models above, the correlation value between variables is no more than 0.8 so it can be said that there is no multicollinearity problem (Gujarati, 2003).

Table 4: Conclusion of test results

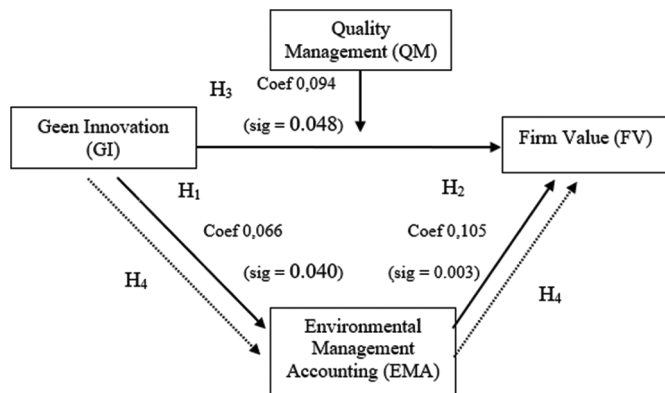
No	Model	Method	Testing	Result
1	Equation I	Uji Chow, Uji, Hausman, Uji Lagrange Multiplier	CEM vs Fem REM vs FEM CEM vs REM	FEM, REM, REM
2	Equation II	Uji Chow, Uji, Hausman, Uji Lagrange Multiplier	CEM vs Fem REM vs FEM CEM vs REM	FEM, FEM
3	Equation III	Uji Chow, Uji, Hausman, Uji Lagrange Multiplier	CEM vs Fem REM vs FEM CEM vs REM	FEM, FEM

Table 5. Mediation model multicollinearity test results

	GI	EMA
GI	1.000000	0.026792
EMA	0.026792	1.000000

Table 6. Multicollinearity test results of moderation model

	FV	GI
FV	1.000000	0.306456
GI	0.306456	1.000000

Figure 2. Path Analysis

Based on the results of the tests that have been carried out and described above, the following conclusions can be drawn (Table 6).

5. CONCLUSION AND SUGGESTIONS

5.1. Conclusion

Based on the results of statistical tests and based on the discussion described in the previous chapter, the conclusions of this study are as follows:

1. Green Innovation influences EMA as evidenced by the p-value of $0.040 < 0.05$ significance level and the t arithmetic value $< t$ table ($15.70705 < 1,97287$).
2. EMA influences Firm value as evidenced by the p-value of $0,0036 >$ the significance level of 0.05 and the t value $< t$ table ($16,55421 < 1,97287$).
3. Green Innovation influences Firm Value as evidenced by the p-value $0.0048 >$ a significance level of 0.05 and the value of t count $< t$ table ($-14.31503 < 1,97287$).

4. EMA has an influence in mediating the relationship between Green Innovation and Firm Value as evidenced by the p-value $0,000 > 0.05$ significance level and the t count $< t$ table ($4,602 > 1,97287$).
5. Quality Management can moderate the relationship between Green innovation and Firm value, which can be proven by a p-value of $0.0147 < 0.05$ significance level and t arithmetic value $> t$ table ($2.508988 < 1,97287$).

5.2. Suggestions

Based on the conclusions and limitations above, the author suggests the following:

1. For Company
In this era of development that has seen a significant increase in environmental activities, companies, especially manufacturing companies, are expected to conduct further research on the effects of Green Innovation, EMA, Green Innovation, Quality Management. With good coordination, companies are able to obtain economic benefits from implementing green innovation which is driven by good EMA, therefore in practice EMA can bridge the company's economy and the environment in achieving company goals.
Adopting quality management standards allows companies to be more efficient in carrying out their operations in terms of inventory turnover ratios thereby producing high returns thereby encouraging the implementation of innovation with the aim of increasing company value.
2. For Further Researchers
 - a. For further research, it is expected to add the number of variables that will be used.
 - b. Further research is expected to use more years of observation and more samples in order to better describe the actual situation.
 - c. Further research can be carried out in different sectors such as the mining sector or the property sector.

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