



# The Impact of Technology and Market Focus on Eco-Innovation (Empirical Study for Surabaya Manufacturing Companies in Surabaya Industrial Estate Rungkut)

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The purpose of this study is to obtain empirical evidence regarding the effects of Technology and Market Focus on Eco-Innovation. This research was conducted by the method of questionnaire distribution to manufacturing companies in Surabaya Industrial Estate Rungkut (SIER). The variables used were eco-innovation, technology, and market focus. The population used in this research were 115 manufacturing companies in SIER. The analytical method used was multiple linear regression with SPSS version 20. From the results of hypothesis testing it has been found that technology and market focus have a positive effect and are proven to be significant to eco-innovation.

**Key words:** *Eco-innovation, technology, market focus.*

## Introduction

Nowadays, climate change and global warming are among the biggest unavoidable environmental problems. Global climate change has been influenced by an unawareness of the environmental impact of industrial activity (Agustia et al., 2019). Every country will start competing to reduce these problems. In the economic sector, there is a concept that can reduce the effects of climate change and global warming; this concept is called green accounting management. According to Boje (1999), green accounting management is a concept to identify, prioritize, quantify and qualify, and merge all environmental costs to business decisions. The environment becomes the main factor in business decisions.



Environmental accounting, or green accounting, describes efforts to combine the costs and benefits of environmental activities in economic decision making (Basuki & Irwanda, 2018).

In 2016, the ASEAN Economy Citizen (MEA) was started by countries that had joined the ASEAN, as the competition to increase economy became more competitive, including in Indonesia. The main factor in a competitive market such as this is innovation; it is caused by trends that always change rapidly. Innovation becomes one of the main concerns for a company seeking to remain on par with those of other countries. Innovation has been defined as new product (goods and services) implementation, or a significant modification to the product, or new marketing methods for the company in their business, workplace organisation or external relationships (OECD, 2008). In Indonesia, green innovation strategies are often discussed in newspapers or at seminars, but there is a lack of implementation in the manufacturing sector (Soewarno et al., 2019).

To overcome environmental problems and to improve company performance, companies must have a view on eco-innovation. Eco-innovation can be linked to the concept of sustainable development, which refers to the ability of the current generation to produce products or services that meet their needs without having a negative impact on future generations (OECD, 2008). Elkington (1998) suggests a theory about the Triple Bottom Line or 3Ps. The Triple Bottom Line theory states that, if the company wants to maintain its survival, then the company must pay attention to the 3Ps (Profit, People, Planet). Elkington recommends that a company is not only measured by its financial performance, but is seen through wider influences such as social and environmental aspects. In addition to the pursuit of profit (Profit), companies must also pay attention to the needs of consumers (People) and their contribution to the environment (Planet). Companies can maintain the sustainability of their business performance in economic, social and environmental aspects through eco-innovation (Pujari, 2006).

Eco-innovation can be linked to the survival of the company (OECD, 2008). The times, the scarcity of raw materials, and the need for greater effectiveness and efficiency are among the reasons why the production process requires innovation. Manufacturing companies must continue to innovate to improve product quality and to save production and operating costs.

Fernando et al. (2016) said that the efforts to increase eco-innovation are influenced by two aspects: namely, technology and market focus. Technology, in the early development of eco-innovation for new products, could act as an important driver (Horbabch, 2008). Market focus helps companies to develop a better understanding of target markets and market needs to reduce the risk of product failure (Day & Wensley, 1988). Horbach et al. (2012) also tested whether different types of eco-innovation (based on their environmental impact) were driven by different factors, carried out on 1,294 companies in Germany. This study provides



empirical evidence that technology and market focus have a significant effect on eco-innovation. Meanwhile, according to research by Cleff and Rennings (1999), conducted on 929 innovative companies in Germany, there is empirical evidence that technology and market focus do not significantly influence eco-innovation.

Due to inconsistencies in previous studies, the researchers are interested in re-examining the influence of technology and market focus on eco-innovation. The companies which form the subject of the research were manufacturing companies located in the industrial area of Surabaya Industrial Estate Rungkut (SIER). The reason SIER was chosen is that it is the largest industrial estate in Surabaya, with many manufacturing companies centred here. The sample used in this study was 115 manufacturing companies in SIER. The analytical method used was multiple linear regression with SPSS version 20. From the results of the hypothesis testing, it was found that technology and market focus have a positive effect and are proven to be significant for eco-innovation.

Furthermore, this research will continue with the following arrangement: a literature review; explanation of variables and samples as well as research models; empirical analysis results and hypothesis testing results; and a summary or conclusion of the study, including suggestions for further research.

## **Literature Review**

### ***Eco-Innovation***

Eco-innovation can be linked to the concept of sustainable development, which refers to the ability of the current generation to produce products or services that meet their needs without having a negative impact on future generations (OECD, 2008). Eco-innovation must focus on developing new products and their production processes to meet customer needs in the most efficient manner. Eco-innovation practices can assist manufacturing companies in creating new products or processes that lead to enhanced innovation capabilities compared with existing competitors.

Eco-innovation is a product, process, marketing and organisational innovation that leads to a significant reduction in environmental burden (Horbach et al., 2012). Based on this statement, it can be concluded that, by implementing eco-innovation, the company not only innovates, but also reduces the environmental impact arising from the production process of eco-innovative products.

### ***Green Technology***

Green technology covers various aspects of technology that help us to reduce human impact on the environment and to create sustainable development (Soni, 2015; Umoren, Akpan & Udoh 2016). Green technology must be maximally used by the company in order to increase productivity and to reduce costs through the effective and efficient use of technology. Green technology aims to meet people's needs for a better quality of life by reducing carbon pollution to the environment. Reducing carbon pollution not only supports reducing pollution and green practices, it can also reduce production costs.

### ***Market Focus***

Market focus is a general strategy that applies a differentiation strategy approach, a low-cost strategy approach, or a combination of the two. It only does so in a narrow niche market (or "focus") and not in a broader market (Pearce & Robinson, 2008). To focus on the markets served, manufacturing companies must have clear market definition and segmentation, product differentiation, marketing mix and strategic plans (Piercy, 2009). Market focus can help companies in determining market targets and needs so that the product can be successful in the market.

### ***Effect of Technology on Eco-Innovation***

Baumol (2002) expresses technology as "innovation breeds innovation". In other words, companies that build technology and invest in R&D encourage further innovation. The company's technological factors also play an important role in eco-innovation, especially at the initial development stage of environmental innovation (Horbach, 2008). In the production phase of innovation, technology selection is the basis for implementing eco-innovation. To be able to develop eco-innovation products that are in accordance with market needs, the latest technology is needed, so companies must be able to select technologies that are compatible with eco-innovation. To meet the expectations of stakeholders, the company must strive to develop its resources and existing business processes by developing technology to improve company performance.

H1. The use of environmentally friendly technology in the production process has a significant influence on eco-innovation

### ***Effect of Market Focus on Eco-Innovation***

Carrillo et al. (2010) emphasise that customer behaviour plays an important role in the application of eco-innovation and its impact on society. Market focus helps companies in



determining the target and market needs for eco-innovative products, so that eco-innovative products can be successful in the market. Companies that focus on market needs and are able to predict future demand will be at the forefront in introducing innovative products.

A change in paradigm and consumer preferences for products that are more environmentally friendly can help companies determine market needs and demand for eco-innovative products, in addition to helping companies produce quality environmentally-friendly products and to increase competitive advantage.

H2. Market focus has a significant influence on eco-innovation.

## **Research Methodology**

### ***Samples and Data Sources***

The data used in this study are primary data in the form of a questionnaire filled out by respondents. Sources of data were obtained from questionnaire answers by production and planning managers at manufacturing companies located in the Surabaya Industrial Estate Rungkut (SIER). The population in this study is a manufacturing company in the industrial area of Surabaya Industrial Estate Rungkut (SIER). The sampling technique that will be used in this study is the saturated sample method with the sample used being the entire population, namely production and planning managers in the manufacturing companies.

### ***Definition of Variable Operations***

The independent variables in this study are technology and market focus. The dependent variable in this study is eco-innovation. The operation definitions in this study are as follows:

#### ***Eco-Innovation***

According to the OECD (2011), eco-innovation is the creation or application of new, or significantly improved, products (goods and services), processes, marketing methods, organisational and institutional structures, and rules aimed at making environmental improvements compared to relevant alternatives.

#### ***Green Technology***

Green technology covers various aspects of technology that help us reduce human impact on the environment and create sustainable development (Soni, 2015). Green technology must be maximally used by the company in order to increase productivity and reduce costs by using technology effectively and efficiently.

### **Market Focus**

Market focus is a general strategy that applies a differentiation strategy approach, a low-cost strategy approach, or a combination of the two. It only does so in a narrow niche market (or "focus") and not in a broader market (Pearce & Robinson, 2008).

### **Analysis Techniques and Research Models**

The analytical tool used in this study is multiple linear regression (multiple regression) with the consideration that this tool can be used as a prediction model for the dependent variable, namely eco-innovation, with several independent variables, namely technology and market focus. The hypothesis test was carried out using the SPSS 20 program.

To test the direct effect of independent variables (technology and market focus) on the dependent variable (eco-innovation) the regression model used to test the hypothesis will be formulated as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + e$$

Definition:

Y : *Eco-Innovation*

a : Constant

$\beta_1, \beta_2$  : Coefficient of Regression Direction

X<sub>1</sub> : *Technology*

X<sub>2</sub> : *Market Focus*

e : *Residual Error*

## **Result and Discussion**

### **Description of Research Results**

The distribution of the research questionnaire ran from March 29, 2018 until April 20, 2018. The distribution was carried out by sending questionnaires directly to each company. The details of the number of deliveries and returning questionnaires in this study are shown in the following table.

**Table 1:** Description of Research Results

Description	Questionnaires	Percentage
Distribute Questionnaires	115	100%
Return Questionnaires	71	61.7%
Questionnaires that don't meet requirements	0	0%
Questionnaires that can be processed	71	61.7%

### ***Validity and Reliability Test Results***

In this study, the researchers used the Pearson bivariate method whereby the test is conducted by doing a bivariate correlation between each item score with the total score of the item. The value of the correlation is compared with the value of r table  $\alpha = 5\%$ ,  $df = n-2$ , where n indicates the total data used. In this study, n was 71, then the df value was 69 with a significance level of 0.05.

**Table 2:** Validity Test Results

<b>Variable</b>	<b>Indicator</b>	<b><i>Pearson Correlation</i></b>	<b>r table</b>	<b>Description</b>
<i>Eco-Innovation</i>	ECO1	0.803	0.234	Valid
	ECO2	0.488	0.234	Valid
	ECO3	0.771	0.234	Valid
	ECO4	0.852	0.234	Valid
	ECO5	0.828	0.234	Valid
	ECO6	0.775	0.234	Valid
	ECO7	0.814	0.234	Valid
	ECO8	0.773	0.234	Valid
<i>Technology</i>	TECH1	0.751	0.234	Valid
	TECH2	0.773	0.234	Valid
	TECH3	0.786	0.234	Valid
	TECH4	0.834	0.234	Valid
<i>Market Focus</i>	MKT1	0.896	0.234	Valid
	MKT2	0.891	0.234	Valid
	MKT3	0.854	0.234	Valid
	MKT4	0.899	0.234	Valid

It can be seen that each indicator in this research questionnaire is declared valid; this comes from the calculated r value of the eco-innovation, technology, and market focus variables which have a higher value than the value of r table.

**Table 3:** Reliability Test Results

<b>Variable</b>	<b>Reliability Coefficient</b>	<b><i>Cronbach Alpha</i></b>	<b><i>Cut-Off</i></b>	<b>Description</b>
<i>Eco-Innovation</i>	8 indicator	0.900	0.600	Reliable
<i>Technology</i>	4 indicator	0.788	0.600	Reliable
<i>Market Focus</i>	4 indicator	0.908	0.600	Reliable

It can be seen that each variable has Cronbach's Alpha > 0.600. Thus, the variables of eco-innovation, technology, and market focus can be said to be reliable.

### ***Normality Test***

Normality test is done by using the Kolmogorov-Smirnov One Sample test by looking at the level of significance. The results showed the Kolmogorov-Smirnov Z value of > 0.05 and the Asymp value. Sig (2-tailed) of > 0.05, so it can be concluded that residual data are normally distributed and the regression model meets the normality assumption.

### ***Heteroscedasticity Test***

The results of this study obtained a significant value (Sig) of each variable value > 0.05, so that it can be concluded this shows that there was no heteroscedasticity in the regression model in this study and the independent variables could be declared as not experiencing symptoms of heteroscedasticity.

### ***Multicollinearity Test***

From the results of the study, it can be seen that the tolerance value > 0.10 and the VIF value of both variables < 0.10, thus, it can be concluded that there are no symptoms of multicollinearity between the independent variables in the regression model.

### ***Autocorrelation Test***

From the results of the study, it can be seen that the Durbin-Watson value is between dU and 4 - dU. It can be concluded that there was no positive and negative autocorrelation in the regression model in this study.

### ***Multiple Linear Regression***

**Table 4:** Multiple Linear Regression Results

Model	Unstandardized Coefficients		t	Sig.	
	B	Std. Error			
1	(Constant)	8.997	2.976	3.023	.004
	MARKET	.755	.175	4.311	.000
	TECHNOLOGY	.477	.198	2.410	.019



Based on the results of Table 4, it can be concluded that technology has a significant effect on eco-innovation. This can be seen based on the significance value of the p-value technology of 0.019, which means the significance level of calculation  $<0.05$  trust level. Technology regression has coefficient value of 0.477. Thus, it can be concluded that the application of technology has a positive effect on the application of eco-innovation. Market focus has a significant effect on eco-innovation. This can be seen based on the significance value of the market focus of 0.000, which means the significance level of p value  $<0.05$  level of trust. Market focus regression has a coefficient value of 0.755, thus, it can be concluded that the application of market focus has a positive effect on the application of eco-innovation.

### ***Effect of Technology on Eco-Innovation***

Based on the results of the analysis, the hypothesis that the use of environmentally friendly technology in the production process has a significant influence on eco-innovation can be accepted. It can be concluded that the use of environmentally friendly technology is one of the important indicators for manufacturing companies in implementing eco-innovation. Implementing the latest green technology will help companies to obtain more benefits in the production process and will support the application of eco-innovation, even though it requires a large investment cost to implement the latest green technology. The latest green technology in question is a machine with high efficiency in managing raw materials and other supporting materials, that is able to accommodate and manage waste properly, and to save energy. The latest green technology has great potential to be utilized optimally so that the production process can run effectively and efficiently. One of the factors required for the optimal utilisation of green technology is to build an R&D unit within the company. Another way to optimally utilize the potential of green technology is to use green technology with a larger portion of manufacturing activities, such as using green technology in all production activities.

Based on the explanation described, it can be concluded that, in order to be able to overcome environmental problems and improve the performance of companies, manufacturing companies can implement eco-innovation. Additionally, one of the supporting indicators of eco-innovation is technology. The results in this study are in line with research conducted by Horbach et al. (2012) and Fernando et al. (2016) which state that technology is positively related to the application of eco-innovation.

### ***Effect of Market Focus on Eco-Innovation***

Based on the results of the analysis, the hypothesis that market focus has a significant influence on eco-innovation can be accepted. It can be concluded that the market focus is one of the important indicators for manufacturing companies in implementing eco-innovation.

The first thing that can be done in implementing a market focus strategy is to set a specific target market to help companies focus more on producing products that meet market needs. To focus on the markets served, manufacturing companies must have clear market definition and segmentation, product differentiation, marketing mix, and strategic plans (Piercy, 2009). To be successful in the future, in the design and production of green products, companies can involve public opinion through the service of advice and criticism. Public input and criticism can be used as a guide for the company to increase their strengths, correct deficiencies, and add value to green products. Public input and criticism can also be used as a source of ideas in the design and production of the next green product.

Based on the explanation described, it can be concluded that, in order to be able to overcome environmental problems and to improve the performance of companies, manufacturing companies can implement eco-innovation. One of the supporting indicators of eco-innovation is market focus. The results in this study are in line with research conducted by Horbach et al. (2012) and Fernando et al. (2016) which state that market focus is positively related to the application of eco-innovation.

## **Conclusion**

This study shows that the use of environmentally friendly technology in the production process has a positive effect and is proven to be significant for eco-innovation. In order to develop eco-innovation products that are in accordance with market needs, the latest technology is needed, so companies must be able to determine the appropriate technology in the application of eco-innovation. The company should strive to develop its resources and existing business processes by developing technology to improve company performance in an effort to meet stakeholder expectations. Thus, the use of environmentally friendly technology is one of the important indicators for manufacturing companies in implementing eco-innovation.

In addition, the results of this study also show that market focus has a positive effect and is proven to be significant for eco-innovation. With a change in paradigm and consumer preferences for products that are more environmentally friendly, it can help companies determine market needs and demand for eco-innovative products. In addition it can help companies to produce quality environmentally friendly products and increase competitive advantage. It can be concluded that market focus is one of the important indicators for manufacturing companies in implementing eco-innovation.

This research has been carried out according to existing procedures; however, it still has limitations in that not all manufacturing companies in SIER returned the questionnaire; only



71 companies were willing to be respondents or returned the questionnaire to researchers from a total of 115 manufacturing companies in SIER. In percentage terms, according to the number of manufacturing companies, only 61.7% of companies wanted to fill out the questionnaire or return the questionnaire, so the power of the tests are not strong enough.

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