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## The Effect of Green Innovation, Green Organizational Culture, Eco-Efficiency and Collaboration on Competitive Advantage

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### ABSTRACT

Currently, the increase and competition of industrial development cause natural resource depletion. It is worsened by the pollution that comes from the production process of manufacturing companies with high-profile status. This study aims to analyze the effect of Green Innovation, Green Organizational Culture, Eco-Efficiency, and Collaboration on Competitive Advantage. This study employed a quantitative approach and used secondary data. Causal research was used to establish a relationship between the variables studied and the results of the research questions. Companies listed on the Indonesia Stock Exchange with high profile status in the Consumer Cyclical, Consumer Non-Cyclical, Basic Materials, Industrials, and Healthcare sectors from 2019-2021, were used as samples and taken by purposive sampling. A total of 67 companies participated, with a total of 201 research samples that lasted for three years. This study used descriptive statistical methods, panel data regression selection tests, and hypothesis testing using Eviews 12 software. The results of the model estimation test show that the selected model, namely the Random Effect Model (REM), is the regression analysis method. This study shows that partially the independent variables Green Innovation and Eco-Efficiency as well as the control variables Firm Size and Financial Performance (ROA) have a positive and significant effect on the Competitive Advantage of High-Profile Companies from 2019 to 2021. Meanwhile, the Green Organizational Culture and Collaboration variables do not affect the Competitive Advantage of High-Profile Companies from 2019 to 2021.

**Keywords:** collaboration; competitive advantages; eco-efficiency; green innovation; green organizational cultures

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## INTRODUCTION

In the era of the 4.0 industrial revolution, industrial development was increasing day by day. This industrial development leads to a rapid pace of the economy and increases public demand for products to meet their needs which leads to competition among industries. As industrial production continues to grow, so does the problem of pollution caused by the waste it generates. Production waste that is directly disposed of without being recycled first can cause water and soil pollution both in industrial areas and residential areas. The competition results in environmental harm as a result of the excessive use of natural resources. As a result, environmental quality decreases and causes global warming, depletion of the ozone layer, water pollution, industrial waste, acid rain, and desertification (Ramlogan, 1997) in (Firmansyah, 2017). In addition to these concerns, the manufacturing industry is also facing critical issues such as scarcity of resources, global warming, limited carbon emissions, and soil erosion. On the other hand, customers are increasingly looking for eco-friendly products and services that are less harmful or even beneficial to the natural environment.

As a result of the lack of awareness of the importance of a green environment, both business actors and/or individuals are the main cause of environmental damage. One of the water pollution cases was found to be done by PT. KSA is a company that produced Corrugated Carton Boxes and Plastic Boxes. The company's B3 waste disposal channels do not meet the requirements, resulting in B3 waste being channeled into the local community's drainage system and eventually polluting the Sadang River on June 15, 2022 (Source: <https://www.bekasikab.go.id>). The growing concern for the environment has prompted environmental advocates to push for all companies to prioritize nature and the surrounding environment when tackling environmental issues. The Indonesian government recently implemented stricter regulations pertaining to the environment. These include Environmental Law No. 46 of 2017, which focuses on Environmental Economic Instruments. Additionally, the Financial Services Authority (OJK) released OJK Regulation Number 51/POJK.03/2017. This regulation aims to promote sustainable finance for Financial Services Institutions, which will help create a financial system that adheres to sustainable principles.

Nanath & Pillai (2017) define competitive advantage as a strategy that makes a business stand out from its competitors and cannot be fully replicated by them. Then, the company can achieve a competitive edge by implementing an environmental strategy that yields sustainable benefits for the company's growth and development. A company is said to be sustainable when the company tries to minimize the negative impact on the environment and social environment and ensures that the future generation can meet their needs and live longer with sufficient resources. Companies can adopt the strategy of Green Innovation to develop environmentally friendly products and production processes that benefit all activities (Muisyo et al., 2022). This approach can provide a competitive advantage and sustainable benefits for all parties involved. This statement is in line with the result of the research conducted by Barforoush et al. (2021) and Muisyo et al. (2022). It was found that green innovation has a significant effect on competitive advantage. Moreover, Berney (1986) states that a company can maintain a sustainable competitive advantage through a unique and valuable culture that cannot be easily replicated by competitors. This can be achieved through the adoption of an Organizational Green Culture strategy that prioritizes environmental concerns and integrates them into the company's core values. When a company fully integrates a green culture into its systems, it is more likely to achieve superior green performance, as suggested by Muisyo et al. (2022). This finding aligns with previous research conducted by Wang (2019) and Widiyati & Murwaningsari (2021), which found that Green Organizational Culture has a significant positive influence on Green Competitive Advantage. When an entity prioritizes ecosystems, it increases the aggressiveness of the company compared to other businesses. To further promote environmental consciousness, companies can practice Eco-Efficiency by utilizing more efficient energy sources, reducing waste, recycling, and

designing and packaging products in an environmentally friendly way during their production processes and marketing approaches. Many companies are now embracing the concept of eco-efficiency, which aims to be environmentally friendly while remaining competitive (Ztruk & Yilmaz, 2016). According to previous studies by Ztruk & Yilmaz (2016) and Azizah et al. (2013), Environmental Management Accounting is a form of eco-efficiency that can improve a company's competitive advantage. To achieve this, companies can also adopt a collaboration strategy with external parties to achieve common goals. By working together, industries can gain access to greater sources of energy, recognition, and rewards, especially when faced with limited resources and competition (Reficco et al., 2018). The findings of Mugni et al. (2022) and Liu et al. (2023) further support the idea that collaboration between companies has a significant impact on competitive advantage.

The purpose of conducting this study is that, currently, business people need to develop production strategies that are different from business competitors to maintain their existence and protect their competitive positioning. The goal can be achieved by promoting awareness of the environment by adopting a strategy that environmentally friendly production activities to shape the competition, so they can compete in the market and cannot be imitated by other competitors. Currently, problems and issues related to green environmental issues are becoming very relevant in the manufacturing sector after increasing public awareness of the environment, strict environmental regulations, and increasing pressure from shareholders to preserve the environment (Muisyo et al., 2022). It happens especially to manufacturing companies that operate in high-profile industries where the company gets the attention of the public and society because its operational activities have the potential and possibility of being related to the interests of the public and society at large. Therefore, the object of research in this study is companies that are listed in the high-profile type of industry, namely, companies that have a high level of sensitivity to the environment, a high level of political risk, or a strong level of competition (Diansari & Ervina, 2022).

### **Basis Theory and Hypothesis**

The theory that becomes a basis for the researchers to formulate hypothesis. The followings are the basis theories that the researchers used:

#### **Legitimation theory**

The theory of legitimacy is a framework that governs the operations of an entity or company, taking into account the needs and expectations of various stakeholders such as the community, individuals, government, and local organizations. Its main objective is to ensure that the company's activities are aligned with societal expectations, making it a system that prioritizes community alignment. The theory of legitimacy is a framework that governs the operations of an entity or company, taking into account the needs and expectations of various stakeholders such as the community, individuals, government, and local organizations. Its main objective is to ensure that the company's activities are aligned with societal expectations, making it a system that prioritizes community alignment (Dewi & Rahmianingsih, 2020). The purpose underlying this theory is that a sustainable entity will prioritize environmental awareness that the entity or company in carrying out its activities provides a balanced value to the environment. Furthermore, the legitimacy theory motivates an entity so that its activities and performance can be accepted by society. Green Innovation and eco-efficiency are related to legitimacy theory because green innovation can gain the social legitimacy of an organization. Due to pressure from various parties, companies are encouraged to pay attention to and be responsible for environmental and social conditions by taking strategic steps, such

as investing in environmentally friendly operational activities, products, and processes through green innovation practices and good environmental management in eco-efficiency practices.

### **Resource-based view theory**

Barney & Hesterly (2015, p. 86) defined Resource-Based View Theory (RBV) as a model of company performance that focuses on the resources and capabilities controlled by the company as a source of competitive advantage. This theory discusses how company resources are managed effectively and efficiently, so they can ultimately create a competitive advantage. Having competent resources can give a company a competitive edge over its rivals. RBV theory suggests that organizations can gain long-term competitive advantage by using resources that are scarce, valuable, inimitable, and non-replaceable. Implementing RBV as a strategic choice can help organizations develop and maximize their returns (Sukma, 2018). Green organizational culture can be a valuable asset for companies in the RBV context. A culture that prioritizes environmental preservation as a core value can lead to competitiveness and sustainability. Additionally, the RBV theory emphasizes collaboration as combining diverse resources can give companies an edge that competitors cannot easily replicate.

### **Stakeholder theory**

According to Freeman and McVea (2001), stakeholder theory refers to any person or group that can impact or be influenced by the attainment of organizational objectives. It is a concept that outlines the parties that a company is accountable for, as described by Freeman (1984). One way companies implement this theory is by providing sustainable reports that cover economic, social, and environmental performance to maintain positive relationships with interested parties (Tahu, 2019). The essence of the stakeholder theory is that the stronger the company's relationship with stakeholders is, the better the business is run. This theory relates to several environmental performance strategies that companies can carry out in their operational activities in environmental disclosure, namely the eco-efficiency strategy, green innovation, and green organizational culture because the bigger the company's role in environmental activities is, the better the company's image for stakeholders is. Organizations that can achieve sustainable competitive advantage and differentiate themselves from competitors in increasingly environmentally conscious markets can directly increase competitive advantage. Then, this theory relates to collaboration whose goal is to help corporations strengthen relationships with external parties to develop competitive advantage. In addition, this theory pertains to a company's economic performance. If a company maintains good economic performance, it will draw attention from stakeholders. One way to do this is by emphasizing the value of financial performance, specifically the Return On Assets (ROA). This metric reflects the company's financial state during a certain period and is used to measure its success from a financial perspective. Stakeholders may also be interested in a firm's size, as measured by its total assets. A larger total asset value signifies that the company has more resources and capabilities to increase profitability and advance the company, thereby increasing its competitive advantage.

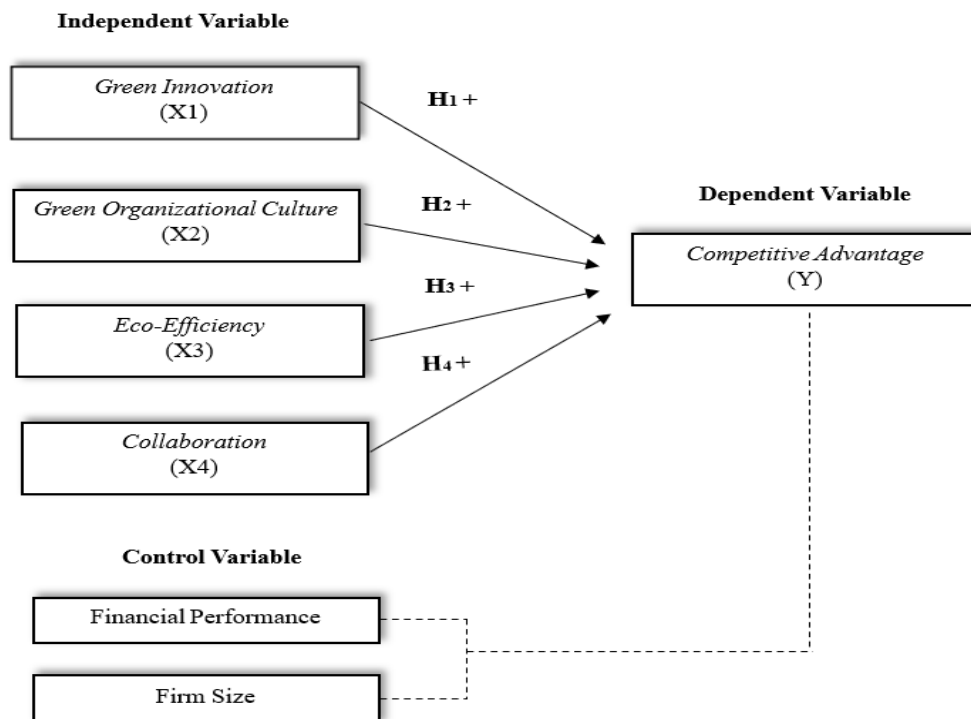


Figure 1. Theoretical framework

Based on the introduction, theoretical basis, and framework, the researchers aims to gather empirical evidence and analyze the factors that influence competitive advantage with the following research hypotheses:

### The effect of green innovation on competitive advantage

Companies that support green innovation can achieve green performance which helps them to improve their corporate image and even to create new markets. It is due to the popularity of the environment among consumers and strict environmental protection regulations can improve the green performance of enterprises, thereby creating a competitive advantage (Wang, 2019). According to a recent study by Barforoush et al. (2021), green innovation can be divided into three areas focused on encouraging competitive advantage. Firstly, stakeholders of green innovation should be treated differently from other innovative strategies because it creates positive external impacts such as environmental improvement. Secondly, innovation in products and processes can increase the creativity of human resources and all aspects of industry and companies, leading to a competitive advantage. Lastly, green innovation can improve product quality levels, increase customer satisfaction, and contribute to industry market share. Green Innovation is focused on the effect of innovation on competitive advantage through creative human resource management towards Green Innovation. This approach is viewed as a reflection of legitimacy theory as a form of strategic step to produce environmentally friendly products in creating a balanced value for the environment. Additionally, stakeholder theory suggests that a company cannot ignore the demands of its stakeholders. Based on this description, the researchers propose the following hypothesis:

H1: Green Innovation has a positive effect on a company's Competitive Advantage.

### The effect of green organizational culture on competitive advantage

The concept of Green Organizational Culture aligns with RBV Theory, as it emphasizes distinctive resources that are hard for rivals to acquire and utilize. Green Organizational Culture is

defined as managerial routines, mechanisms, approaches, or ideas that support entities in securing industrial ecological goals, adhering to pro-environmental policies, assessing the environmental significance of entity operations, as well as measures to reduce "waste and pollution" before a regulation or seeking methods which are no doubt to take advantage of business prospects through environmental improvement in increasing industrial ecological activities efficiently and effectively (Chen, 2008) in (Widiyati & Murwaningsari, 2021). The Green Culture of an organization has unique characteristics that make it hard for competitors to copy. It also helps members of the organization recognize environmental issues as fundamental values. By implementing activities and policies that prioritize environmental preservation, companies can gain value and gain a competitive edge Wang (2019). Engaging in environmental preservation activities can enhance a company's reputation and appeal to stakeholders, as per the stakeholder theory. The researchers put forth a hypothesis based on this observation:

H2: A company's adoption of a Green Organizational Culture results in a positive effect on its Competitive Advantage.

### **The effect of eco-efficiency on competitive advantage**

Companies will gain social legitimacy if they emphasize their activities according to the prevailing norms in society by implementing eco-efficiency as a form of a good environmental management system. Eco-efficiency is a production strategy aimed at reducing product-related environmental impacts and risks to human health. While planning production for the future, today's businesses must consider the fact that future generations have access to the natural resources used today and shift to environmentally friendly production activities. The goal of the eco-efficiency strategy is to reduce the use of water, energy, and raw materials during all stages of production. The processes are regularly reviewed to minimize pollution and waste, which helps to protect the environment and make companies more competitive. Implementing eco-efficiency as a production strategy can generate additional revenue and reduce production costs for businesses (Zturk and Yilmaz, 2016). Having good environmental performance is reflected in a company's eco-efficiency strategy (Ar, 2012). When a company practices eco-efficiency and has good environmental performance, they are more highly regarded by the public and maintains positive relationships with stakeholders. It can even lead to long-term relationships. Based on this information, the researchers propose the following hypothesis:

H3: Eco-Efficiency has a positive effect on Competitive Advantage.

### **The effect of collaboration on competitive advantage**

Collaboration can increase competitive advantage. It is because the resource network generated by inter-firm collaboration accelerates obtaining external information within the firm and enables firms to respond to changes in the external environment through dynamic capabilities and propose innovative performance to create excellence (Liu et al., 2023). Following stakeholder theory, establishing collaboration aims to assist companies in strengthening relationships with external parties so that companies receive more support in developing competitive advantages. Resource Base Value Theory is related to collaboration as it involves competencies, soft skills, and establishing a good relationship with external parties. Collaborating with other companies can obtain more important external information, where companies can use strategies of collaborating with other companies to internalize external knowledge to improve technology and create collaborative benefits (Ndubisi et al., 2020). Based on this description, the researchers propose the following hypothesis:

H4: Collaboration has a positive effect on Competitive Advantage

## RESEARCH METHOD

### Research Plan

The researchers conducted quantitative research using the Eviews program version 12. The study focused on 201 companies listed on the Indonesia Stock Exchange (IDX) between 2019-2021. A purposive sampling method was used to select a sample of High Profile Companies from the Basic Materials Sector, Industrial, Consumer Non-Cyclicals, Consumer Cyclicals, and Healthcare industries listed on the IDX from 2019 to 2021. The selected companies published a complete annual report for the same period. The information utilized in this study consists of secondary data gathered from sustainability reports and company annual reports, which were obtained from the IDX website, specifically [www.idx.co.id](http://www.idx.co.id), as well as the company's website. The approaches to analyzing the data in this research involve conducting a descriptive statistical test, selecting a panel data regression model, and performing a hypothesis test.

### Definition of Variable and Measurement

The variables used in this study consisted of four independent variables (x), one dependent variable (y), and two control variables (control). The following describes these variables:

#### Competitive advantage (Y)

Rapid economic growth can bring benefits, but it also leads to intense competition (Liu et al., 2023). Competitive advantage refers to a company's ability to outperform its rivals by utilizing its resources effectively (Roos Ana et al., 2021). A business can be considered to possess a competitive advantage if it possesses a distinctive and challenging-to-replicate feature that sets it apart from other companies within the same market or industry. The existence of this competitive advantage strategy is intended to increase the added value of the goods and services offered by the company in meeting the needs of consumers who still pay attention to the environment.

The level of competitive advantage is determined by the Return On Invested Capital (ROIC) in this study. When the ROIC is high, investors receive higher returns and are more likely to invest in the company. Companies with high ROIC often face competition, making it a reliable indicator of financial performance. By maintaining or increasing ROIC over an extended period, companies can establish a sustainable competitive advantage (Tang & Liou, 2010) in (Widyaningdyah & Aryanani, 2013).

$$\text{ROIC} = \frac{\text{NOPAT}}{\text{IC}}$$

Information:

ROIC = Return On Invested Capital

NOPAT = Net Operating Profit After Taxes (Sales less Cost of Goods Sold, Advertising & Promotion Expenses, Research & Development Expenses, Depreciation Expenses, Selling General & Administrative Expenses, Income Tax Expenses) then divided by sales.

IC = Invested Capital (Cash plus Accounts Receivable and Inventory, Fixed Assets then minus Accounts Payable) then divided by sales.

#### Green innovation (X1)

According to Barforoush et al. (2021), green innovation is an important tool for companies to win the competition in an era of environmental concern. Green innovation refers to a range of improvements made to a product through the use of technology, to reduce energy consumption,

mitigate pollution during production, recycle waste, create eco-friendly products, and manage the environment of the company. It involves the replacement of limited resources with sustainable natural resources.

The measurement of Green Innovation is done through content analysis. Each indicator point is assigned a value of 1 if the company has conducted business activities related to that indicator, and a value of 0 if the company has not. Then, the indicator points obtained are added up and divided by the total points of all indicators.

$$\text{Green Innovation} = \frac{\text{The total items disclosed for each element (n)}}{\text{The total of all indicators (k)}}$$

### **Green organizational culture (X2)**

Green organizational culture is a system of beliefs, values, inspiration, principles, and attitudes that shape organizational behavior and commitment related to environmental protection (Afum et al., 2020). Green organizational culture has different characteristics from its competitors' cultures and is not easily imitated by competitors and is an intangible asset, and guides organizational members to accept environmental issues as a core value in the organization.

Green organizational culture is measured based on content analysis. Where each indicator point is given a value of 1 if the company has carried out business activities following the indicator and given a value of 0 if the company has not done so. Then, the indicator points obtained are added up and divided by the total points of all indicators.

$$\text{Green Organizational Culture} = \frac{\text{The total items disclosed for each element (n)}}{\text{The total of all indicators (k)}}$$

### **Eco-efficiency (X3)**

Eco-efficiency is a concept contained in environmental management accounting that displays the relationship between productive activities and low use of energy sources (Agustia et al., 2019). This effort can reduce environmental impact and excessive resource consumption. Eco-efficiency is addressed through the use of resources, where companies carry out resource efficiency to minimize negative impacts that cause harm to the environment such as waste and pollution (Dewi & Rahmianingsih, 2020).

Eco-efficiency is measured based on content analysis. Where each indicator point is given a value of 1 if the company has carried out business activities by the indicator and given a value of 0 if the company has not done so. Then, the indicator points obtained are added up and divided by the total points of all indicators.

$$\text{Eco-Efficiency} = \frac{\text{The total items disclosed for each element (n)}}{\text{The total of all indicators (k)}}$$

### **Collaboration (X4)**

Collaboration is a term frequently used to describe a pattern of cooperation carried out by more than one party. Collaboration involves setting goals together with other parties, sharing responsibilities, and working together. Collaboration is associated with positive ideas of interaction and convergence of efforts for specific accomplishments. Therefore, the presence of collaboration among companies is highly correlated with joint innovation which obviously can deliver benefits that are increasingly difficult to compete with (Liu et al., 2023).



This collaboration is measured based on content analysis in which each indicator point is given a value of 1 if the company has carried out business activities following the indicator and given a value of 0 if the company has not done so. Then, the indicator points obtained are added up and divided by the total points of all indicators.

$$\text{Collaboration} = \frac{\text{The total items disclosed for each element (n)}}{\text{The total of all indicators (k)}}$$

### Financial performance (Control 1)

Financial performance is the condition of a company's finances which is analyzed using financial analysis to find out the good and bad conditions of the company's financial performance reflected in a certain period (Gani et al., 2020).

$$\text{ROA} = \frac{\text{Net Income}}{\text{Total Assets}} \times 100\%$$

### Firm size (Control 2)

Firm size is a scale for classifying the size of the company in several ways, such as the total value of assets. Total assets are a measurement tool that is commonly used because it can reflect the company's wealth. If the company's asset level is high, it indicates good company performance and vice versa (Nugraha et al., 2021).

$$\text{Firm Size} = \text{Log } n (\text{Total Assets})$$

## RESULT AND DISCUSSION

### Descriptive Statistical Test

Descriptive statistical tests provide an overview or description of data seen from the average value (mean), standard deviation, maximum, and minimum (Ghozali, 2018).

Table 1. Result of descriptive statistical test

	N	Minimum	Maximum	Mean	Std. Deviation
Competitive Advantage	201	-1.27550	0.43140	0.06723	0.154145
Green Innovation	201	0.25000	1.00000	0.77985	0.212966
Green	201	0.16670	1.00000	0.79933	0.211681
Organizational Culture					
Eco-Efficiency	201	0.12500	1.00000	0.78172	0.215069
Collaboration	201	0.00000	1.00000	0.67497	0.236739
Financial Performance	201	-1.0498	0.607167	0.045245	0.132836
Firm Size	201	25.3102	33.5372	28.9537	1.873115

Based on Table 1, it is known that the objects studied (n) in 2019-2021 were 201 samples in high-profile companies in the Basic Materials, Industrial, Consumer Non-Cyclicals, Consumer Cyclicals, and Healthcare sectors. Table 1 is used to assist in identifying the size of the deviation for each variable that affects one variable to another. Where the Competitive Advantage and Financial

Performance variables are heterogeneous or varied (std. dev > mean), meaning that the various data distributions result in a high level of deviation. Then, the variables Green Innovation, Green Organizational Culture, Eco-Efficiency, Collaboration, and Firm Size are homogeneous (std. dev < mean), meaning that they have a low level of deviation.

With an average (mean) Competitive Advantage value of 0.06723, it means that the average competitive advantage variable is low because the average value does not reach 0.100000 (10%). It can be inferred that from 201 companies, the asset turnover is quite high, but debt is high enough which further reduce a company's income.

The average value (mean) of Green Innovation is 0.77985 from 201 companies, meaning that this value reflects a high and very good value because the resulting average value is close to the maximum value. These results indicate that most of the research data samples apply the four aspects of environmental innovation as a set of innovations in an environmentally friendly product to reduce the consequences of environmental pollution.

With an average (mean) Green Organizational Culture value of 0.799333 from 201 sample companies, it means that this value reflects a high value because the resulting value is close to the maximum value. The results of these average values indicate that the 6 indicators set have been implemented by most of the 201 sample companies in efforts to preserve the company's environment in shaping behavior and organizational commitment related to environmental protection.

With an average (mean) Eco-Efficiency value of 0.78172 from 201 sample companies, it means that this value reflects a high value because the resulting value is close to the maximum value. The results of the average value indicate that of the 8 indicators set, most of the 201 sample companies have implemented environmental management for the company's production activities in minimizing the impact on the environment.

With an average Collaboration value of 0.67497 from 201 sample companies, it means that this value reflects a high value because the resulting value is close to the maximum value. The results of the average value show that of the 3 indicators set, most of the 201 sample companies have been implemented in collaboration engagement and joint innovation, which obviously can produce advantages that are increasingly difficult to compete with.

With an average (mean) ROA value of 0.045245 from 201 sample companies, it means that the average value of the ability of company assets to generate profits is low.

Firm size has the lowest (minimum) value of 25.3102 or IDR 98,191,210,595 recorded by PT. Pratama Abadi Nusa Industri Tbk in 2020 which is seen from the total assets it has. The highest (maximum) value of 33,5372 was recorded by PT Astra International Tbk of IDR 367,311,000,000,000 in 2021 which is seen from the total assets it owns.

### **Panel Data Regression Method Selection Test**

Here are the steps to choose among the common effect model, fixed effect model, and random effect model as a panel data regression model.

#### **Chow test**

The Chow test was conducted to choose between the common effect and the fixed effect as a panel data model, as seen from the chi-square (probability) cross-section.

Information:

$H_0$ : Common Effect (probability > 0.05)

$H_a$ : Random Effect (probability < 0.05)

### Hausman test

The Hausman test was conducted to choose between the fixed effect and the random effect as a panel data model, as seen from the random cross-section (probability).

Information:

$H_0$ : Random Effect (probability > 0.05)

$H_a$ : Fixed Effect (probability < 0.05)

### Langrange multiplier test

The Lagrange Multiplier test was conducted to choose between the common effect and random effect as a panel data model, which is seen in the Breusch-pagan (probability) cross-section.

Information:

$H_0$ : Common Effect (probability > 0.05)

$H_a$ : Random Effect (probability < 0.05)

Table 2. Result of panel data regression method selection test

Summary Test	Alpha	Prob	Explanation	Result
Chow Test	< 0.05	0.0984	CEM vs FEM	<i>Common Effect Model</i>
Hausman Test		0.4121	REM vs FEM	<i>Random Effect Model</i>
Langrange Multiplier Test		0.02708	REM vs CEM	<i>Random Effect Model</i>

Based on the results of Table 2, the Chow test shows that  $H_0$  is accepted and  $H_a$  is rejected, so the Common Effect Model is better used in panel data regression analysis. However, the Hausman test shows that  $H_0$  is accepted and  $H_a$  is rejected, so the Random Effect Model is better used in panel data regression analysis. These results are then supported by the Langrange Multiplier Test where  $H_0$  is rejected and  $H_a$  is accepted, indicating that the Random Effect Model is better used in panel data regression analysis. Based on these results, the Random Effect Model is the best model for panel data regression tests.

### Hypothesis Test

#### Test of coefficient determination ( $R^2$ )

Test the Coefficient of Determination ( $R^2$ ) to measure the closeness between the predicted value and the actual value of the independent variable. If the R-value of a regression is close to 1, the stronger the relationship between the dependent variable and the independent variable and vice versa.

Table 3. Result of coefficient determination test ( $R^2$ )

Predictors	Adjusted R-squared
<i>(Constant), Green Innovation (X1), Green Organizational Culture (X2), Eco-Efficiency (X3) dan Collaboration (X4), Financial Performance-Return On Asset (K1) and Firm Size (K2)</i>	0.418621

Based on the test results for the Coefficient of Determination ( $R^2$ ) in Table 3, the Adjusted R Square value is 0.418621. It means that the values of the variables (Green Innovation, Green Organizational Culture, Eco-Efficiency, Collaboration, Financial Performance, and Firm Size) are collectively able to influence the dependent variable (Competitive Advantage) by 41.8% while the remaining 58.2% is explained by other variables or factors.

### Test of simultaneous significance (F-Test)

The simultaneous Significance Test (F Test) was done to determine whether all independent or independent variables included in the model have a joint or simultaneous effect on the dependent variable at a significance level of 5%.

Information:

H0: Probability value  $< 0.05$ , the independent variable (x) has a simultaneous effect on the dependent variable (y)

Ha: Probability value  $> 0.05$ , the independent variable (x) has no simultaneous effect on the dependent variable (y)

Table 4. Result of simultaneous significance test (F-Test)

F-statistic	Prob (F-statistic)	Conclusion
25.00161	0.000000	Has a Simultaneous Effect

Based on the results of the Simultaneous Significance Test (F Test) in Table 4, the Fcount value is 25.00161 with a probability value of 0.000000. From the sig value of the F test of 0.000000 where this value is less than 0.05, then H0 is accepted. It can be concluded that the independent variables are green innovation, green organizational culture, eco-efficiency, collaboration, and the control variables of financial performance and firm size together (simultaneously) affect the dependent variable Competitive Advantage.

### Test of partial significance (T-Test)

The Partial Significance Test (T-test) aims to determine whether the independent variable has a statistically significant or not significant effect on the dependent variable at a significance level of 5%.

Information:

H0: If the Sig.  $< 0.05$ , then the independent variable (x) affects the dependent variable (y)

Ha: If the Sig.  $> 0.05$ , then the independent variable (x) does not affect the dependent variable (y)

Table 5. Result of partial significance test (T-Test)

Variable	Directional Hypothesis	B	t-Statistic	Sig (One tailed)	Conclusion
Constant		-0.1925	-1.45042	0.1486	
Green Innovation	(+)	0.109124	2.187753	0.0299	H1 Accepted
Green Organizational Culture	(+)	0.081716	1.612861	0.1084	H2 Rejected
Eco-Efficiency	(+)	0.150428	3.040516	0.0027	H3 Accepted
Collaboration	(+)	0.080485	1.769592	0.0783	H4 Rejected
Financial Performance	(+)	0.674953	11.32285	0.0000	
Firm Size	(+)	0.009242	2.661652	0.0098	

$$CA = -0.1925 + 0.109124 GI + 0.081716 OGC + 0.150428 ECO + 0.080485 CL + 0.674953 ROA + 0.009242 SIZE + \varepsilon$$

Based on the results of the Partial Significance Test (T-Test) in Table 5 with a significance level of 5%, the following interpretation is obtained:

H1: green innovation has a coefficient value of 0.109124 and sig 0.0299 where this value is lower than 0.05, meaning that H1 is accepted, green innovation has a positive and significant effect on Competitive Advantage

H2: green organizational culture has a coefficient value of 0.081716 and sig 0.1084 which means it is greater than 0.05, meaning that H2 is rejected, so green organizational culture does not affect Competitive Advantage

H3: eco-efficiency coefficient value of 0.150428 and a sig of 0.0027 where this value is lower than 0.05, meaning that H3 eco-efficiency has a positive and significant effect on Competitive Advantage.

H4: collaboration has a coefficient value of 0.080485 and sig 0.0783 which means it is greater than 0.05, meaning that H4 is rejected, collaboration does not affect Competitive Advantage

ROA: financial performance has a coefficient value of 0.674953 and sig 0.0000 which means it is lower than 0.05, meaning that financial performance has a positive and significant effect on Competitive Advantage

SIZE: firm size has a coefficient value of 0.009242 and sig 0.0098 which means it is lower than 0.05, meaning that firm size has a positive and significant effect on Competitive Advantage.

## Hypothesis Discussion

### H1: Green innovation has a positive and significant effect on competitive advantage

According to studies conducted by Barforous et al. (2021), green innovation has a positive and notable impact on competitive advantage. This means that the more innovative a company is, the greater the advantage it will have over its competitors (Awaliyah & Haryanto, 2022). Based on legitimacy theory, the researchers suggest that companies that prioritize environmental issues and social responsibility gain greater support and recognition from society and the public. By implementing eco-friendly technologies and processes, companies can mitigate risks related to environmental regulations and contribute positively to long-term excellence. This differentiation can lead to increased customer attraction and market share, resulting in higher income and a positive impact on return on investment (ROIC) for investors. Businesses that prioritize creating eco-friendly products can establish stronger connections with their stakeholders, leading to lasting support and sustainable benefits aligned with stakeholder theory.

### H2: Green organizational culture has no effect on competitive advantage

The findings obtained are not consistent with the study conducted by Widiyati and Murwaningsari (2021), whose research suggests that having a green organizational culture can significantly enhance competitive advantage. On the other hand, this aligns with the results of the study by Awaliyah and Haryanto (2022) that reveal companies have not yet fully disclosed their green organizational culture in maintaining their commitment to environmental preservation in the corporate setting. The researchers suggest that although the average value of descriptive statistics is 77.985%, which appears high, the company is not fully committed to prioritizing environmental awareness in its business. This lack of commitment has caused the level of public trust to remain low. The management of the organization has not fully embedded knowledge about the environment, which has impacted the company's ability to compete in an increasingly environmentally conscious market. This lack of competitiveness can affect the company's profitability or income, and the value of return (ROIC) to investors may not be high enough. These results contradict the theory of Resource

Base Value, as the green organizational culture has not influenced competitive advantage. According to stakeholder theory, consumer behavior can change due to changes in the economic situation and urgent needs, leading to reduced demand for products or services related to green culture. This change can cause the company's priorities to shift, focusing more on business continuity or economic aspects. This shift in priority may divert the commitment from environmental preservation or sustainability, which is the core value of green organizational culture, resulting in a weak competitive ability.

### **H3: Eco-efficiency has a positive and significant effect on competitive advantage**

The result is in line with research from Zturk and Yilmaz (2016), eco-efficiency has a positive and significant impact on competitive advantage. Eco-efficiency can be viewed as a cost strategy that provides businesses with a competitive edge in terms of cost reduction. Companies can reduce waste and excessive use of resources like raw materials, energy, and water by adopting efficient production methods (Zturk and Yilmaz, 2016). This helps to lower production costs, resulting in higher net profits and an increased ROIC. Eco-efficient practices can also lead to the creation of innovative and environmentally friendly products. These products can appeal to consumers who are more environmentally conscious and meet the growing demand for sustainable products. This can enhance a company's competitiveness and boost profits, resulting in increased revenue and a positive impact on return on invested capital (ROIC) for investors. Thus, in line with the stakeholder theory that by implementing eco-efficiency practices, companies can meet the needs and expectations of stakeholders, achieve sustainability, and gain a competitive advantage, in line with stakeholder theory. The company being studied has implemented eco-efficiency as a form of environmental management awareness, which aligns with the prevailing norms in society. This approach is based on the theory of legitimacy, which means that the company aims to provide a balanced value to the environment while carrying out its activities. As a result, the company has added value for investors who support its sustainability, creating a competitive advantage over its competitors.

### **H4: Collaboration has no effect on competitive advantage**

The findings of this study differ from the research done by Liu et al. (2023), who discovered that collaboration has a favorable and significant impact on competitive advantage. They found that companies can enhance their chances of success in varying markets by collaborating with business partners. However, the obtained results exceed the anticipated direction. The companies examined may not be fully concentrating on collaboration strategies for gaining the ability to compete. Instead, they prioritize internal activities, such as increasing the value of Return On Assets. Companies must focus on external activities such as market share, customers, and industry trends. Companies must also seek opportunities for innovation that can give them a competitive advantage. The Covid-19 pandemic has had an impact on stakeholder theory, particularly in terms of limiting a company's ability to collaborate with external parties such as business partners, suppliers, or investors. This is due to disruptions in global supply chains resulting from travel restrictions and remote work, which can slow down or make collaboration less relevant in joint innovation development, knowledge exchange, and new product development. Additionally, the pandemic has led to a decrease in revenue for many companies across different sectors, resulting in changes in consumer behavior that may lead to a decrease in demand for products, ultimately affecting a company's income and ability to generate high returns on invested capital (ROIC) through collaboration. Consequently, collaboration may not significantly contribute to a company's competitive advantage in current conditions.

**Financial performance (ROA) has a positive and significant effect on competitive advantage**

These results are in line with Sianturi et al. (2021) and Fabiola & Khusnah (2022) show that financial performance has a positive effect on Competitive Advantage. A high ROA indicates that a company can use its assets efficiently to generate profits and create a competitive advantage. According to the stakeholder theory, a company's financial performance is a key indicator of its ability to generate profits while managing assets effectively. By improving its financial performance (measured by ROA), a company can increase stakeholder confidence, attract potential investors and creditors, and build trust with related parties. This success in generating higher income leads to increased profitability and a positive impact on the return on investment (ROIC) for investors. This improved financial performance allows companies to focus on operational and competitive advantage activities.

**Firm size has a positive and significant effect on competitive advantage**

These results are in line with research (Nyuur et al., 2019). The larger companies have an easier time obtaining funding sources to achieve their goals, including gaining a competitive advantage over their competitors (Indriyani, 2017). The studied company has a significant advantage over others due to its large total assets. One benefit of having a high total asset value is that it often indicates that a company is large and has a greater operational capacity. This can contribute to building trust and a positive reputation among stakeholders, which can be a valuable advantage in a competitive market. When stakeholders have a high level of trust, it can result in improved opportunities such as attracting more investment and forming profitable partnerships. This increased trust can also lead to higher returns on investment (ROIC) due to increased income and access to better resources, ultimately improving competitive advantage.

**CONCLUSION**

Based on the study conducted, it is found that the Green Innovation and Eco-Efficiency factors have a positive and significant effect on the Competitive Advantage of High Profile Companies from 2019 to 2021. However, Green Organizational Culture and Collaboration do not have any effect on the Competitive Advantage. It is also observed that the control variables, Financial Performance (ROA) and Firm Size, have a positive and significant effect on the Competitive Advantage of High Profile Companies from 2019 to 2021.

There are some limitations to this study. Firstly, the data were obtained through content analysis and the results may be subjective due to the researchers' personal bias. Additionally, there were challenges in conducting the data search due to varying keywords used. Secondly, it is important to consider previous research on collaboration and firm size's impact on competitive advantage in order to think logically about the findings. Lastly, the adjusted R<sup>2</sup> result of 41.8% indicates that the independent variable can only explain 41.8% of the dependent variable, with the remaining 58.2% being influenced by other variables outside the scope of this research.

Based on the limitations identified in this study, the researchers recommend being more cautious when searching for keywords related to variables using content analysis to avoid bias. Future researchers can measure the Green Organizational Culture variable using proxies, as demonstrated in the study by Widiyati & Murwaningsari (2021), and examine the Collaboration variable using the approach taken in Mugni et al.'s (2022) research, as well as investigate the Competitive Advantage variable in line with Purwanto & Mela's (2021) study. The adjusted R<sup>2</sup> result of 41.8% suggests that other variables may also have an impact on a company's Competitive Advantage. Therefore, further research can explore additional independent variables such as Business Strategy, Environmental

Performance, Entrepreneurial Motives, and Entrepreneurial Orientation to broaden the discussion on Competitive Advantage.

This study has several implications that may be useful for interested parties. These implications include:

1. Theoretical

This study aims to contribute to the advancement of science in Indonesia by providing valuable insights. The findings indicate that the implementation of legitimacy theory and stakeholder theory in this study reinforces the independent variables of green innovation and eco-efficiency, resulting in a positive impact on Competitive Advantage. Additionally, the use of stakeholder theory reveals that financial performance control variables (ROA) and firm size, also have a beneficial effect on Competitive Advantage. This research can serve as a reference or comparison material for future studies and can be adapted to current conditions to further advance the field.

2. Practical

a. For Company

It is hoped that this research will encourage companies in Indonesia to prioritize good environmental management by adopting Green Innovation and Eco-Efficiency. It will not only add value to their business and improve their image in the eyes of stakeholders but also boost their ROA and Firm Size, which reflects the financial success of a good company and enhances its Competitive Advantage.

b. For Investor

It is hoped that this research can be used by investors as investment decision-makers because companies that have a high level of Return On Assets and Total Assets can create a Company Competitive Advantage. In addition, the company has good environmental and social awareness by implementing Green Innovation and Eco-Efficiency strategies in achieving the Company's Competitive Advantage.

c. For Government

The research can provide valuable information for creating a concept map on environmental issues, particularly sustainability. The government can utilize the research findings to evaluate environmental regulations and enforce strict auditing procedures on businesses to ensure compliance with proper environmental standards.

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