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## Analysis of the Effect of Green Organizational Culture on Organizational Performance and Competitive Advantages of Green through Green Innovation in Manufacturing Industries

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**Abstract:** The impact of company activities on the environment is an important issue today. Due to its importance, the purpose of this study is to examine the influence of green culture organizations on organizational performance and green competitive advantage mediated by green innovation. The sample used is a leadership level consisting of CEOs, managers, and a team of experts in the manufacturing industry, with 185 respondents. The sampling technique was purposive sampling. The analytical method used is the Structural Equation Model (SEM). This study shows a positive and significant influence of green culture organization on green innovation, green competitive advantage, and organizational performance for the direct effect. And also an indirect effect, green culture organization through green innovation has a positive and significant influence on green competitive advantage and organizational performance. These results indicate the importance of a green strategy implemented within the company because it will increase its competitiveness and performance in economic, operational, and environmental aspects. In this study, the authors seek to contribute to the development both in theory and practice. The strategy carried out by the company must pay attention to environmental factors because it is to pay attention to the continuity of the business being carried out. Companies that pay attention to environmental factors today can win the business competition for a long time. That is proven by the results of research done.

**Keywords:** green culture organization, green innovation, green competitive advantage, organizational performance.

## 制造业绿色创新对绿色组织文化对组织绩效及绿色竞争优势的影响分析

**摘要：**公司活动对环境的影响是当今的一个重要问题。由于其重要性，本研究的目的是考察绿色文化组织对绿色创新介导的组织绩效和绿色竞争优势的影响。使用的样本是由首席执行官、经理和制造业专家团队组成的领导层，有185名受访者。抽样技术是有目的的抽样。使用的分析方法是结构方程模型。本研究表明，绿色文化组织对绿色创新、绿色竞争优势和组织绩效具有积极而显着的直接影响。还有一个间接效应，通过绿色创新的绿色文化组织对绿色竞争优势和组织绩效具有积极而显着的影响。这些结果表明在公司内部实施绿色战略的重要性，因为它将提高其在经济、运营和环境方面的竞争力和绩效。在这项研究中，作者力求为理论和实践的发展做出贡献。公司实施的战略必须注意环境因素，因为它要注意正在开展的业务的连续性。今天关注环境因素的公司可以在很长一段时间内赢得商业竞争。所做的研究结果证明了这一点。

**关键词：**绿色文化组织、绿色创新、绿色竞争优势、组织绩效。

### 1. Introduction

The growing public awareness and concern for environmental sustainability encourage companies to

integrate sustainability into corporate strategies and activities [8], [9]. The emergence of environmental sustainability as an area of competitive advantage has

prompted many academics to research the identification of competencies and capabilities of managers and businesses that improve company performance, including economic and environmental performance [1], [2], [3]. In addition, several studies also state that changes in public demands also encourage companies to increase their competitive advantage to maintain and improve the company's business existence. Organizations are now forced to identify and implement innovative and sustainable solutions within the organization's boundaries and across the supply chain network [4].

Hoffman [5] explains that companies face increasing pressure to be more environmentally friendly from stakeholders (consumers/buyers, investors, bankers, NGOs, etc.) to reduce negative impacts on the environment. Companies must try to overcome these pressures in many industries as they seek to remain competitive in similar industries. Corporate social responsibility is generally associated with reducing competitiveness. Still, companies can reduce their environmental impact without harming economic performance by implementing innovation strategies more quickly and adapting to environmental changes. Opportunities can be found to increase income or reduce costs [6]. The novelty in this research is trying to find new things that have never been done in the manufacturing sector. It is very beneficial for industrial development and policymakers to pay close attention to environmental factors. If it is not considered, it will cause very high costs.

## 2. Literature Review

UNEP, which was formed in 1980, identifies what is needed for long-term solutions and focuses on environmental and development goals where the terminology of 'sustainable development' or sustainable development is used in strategic planning as the goal of all efforts to improve the quality of human life and the preservation of the diversity of the earth. This strategy specifically addresses the issue of nature conservation so that it does not provide a holistic view of sustainability so that in 1987, the Brundtland Report "Our Common Future" emerged, which presented ways to keep the world's population growing and meet its needs, which led to the most famous definition of sustainable development, namely economic and social services that meet the needs of current generations without compromising the ability of future generations to meet their own needs [7].

Starting from the Millennium Development Goals (MDGs), a millennium declaration in the form of eight goals to be achieved by 2015, the result of the agreement of heads of state and representatives from 189 countries, blessed in September 2000, almost all countries in the world made the MDGs as a development paradigm. Various countries continue to monitor their achievements through several indicators

of achievement in their respective countries, which show the global community's commitment to the implementation of the MDGs even though the goals and targets of the MDGs are not legally binding.

Sustainable Development Goals, abbreviated as SDGs or the goals of sustainable development, were born at the United Nations Conference in Rio de Janeiro in 2012, which produced a group of universal goals that could meet the urgent environmental, political, and political conditions economic challenges facing the world. The SDGs are expected to become a development plan that will solve what the MDGs have set and a development plan that can face old and new challenges increasing climate change. As the results of the 2012 United Nations Sustainable Development Conference (Rio20+) emphasized that all international communities must carry out global development in a way where all nations must be responsible for the welfare of humans and the planet, the SDGs are expected to become a transformation plan that will reshape global development that benefits generations. who will come [10].

CSR is a concept that gives rise to various definitions, as can be seen from a variety of literature due to the emphasis on different dimensions. As a concept that is accepted by the business world, CSR is much older than sustainable development. An article by Nicholas Eberstadt, published in 1973, states that CSR had its roots in ancient Greece when the government made rules about the behavior of entrepreneurs and traders [11].

The concept of CSR emerged in the 1950s. Howard R. Bowen published his monumental book, "Social Responsibility by Businessman" [12] and defined CSR as the obligation of entrepreneurs to pursue their policies, make decisions, or follow desired lines of action in terms of societal goals and values. He argues that the entrepreneur is responsible for the consequences of his actions in a somewhat broader scope than the company's financial performance, demonstrating the existence and importance of the company's social performance.

Measuring performance is an important factor for organizations. Most organizations recognize that measuring business performance is important, but organizations do not have a systematic process with defined parameters for evaluation and control. Performance is a parameter used to measure "the efficiency and effectiveness of past actions and" an organization's ability to achieve its goals, using its resources efficiently [13].

Strong competitive advantage is a common goal shared by many organizations. Because competitive advantage can lead to higher company performance, hotels focus on developing competitive activities [6], [14]. The resource-based view emphasizes that the company's unique resources and capabilities are the

main drivers of competitive advantage and business performance.

Green culture is an environmental ideology that aims to promote sustainable economic and ecological development based on science, politics, and aesthetics. Several decades ago, companies began to consider a green culture approach in implementing corporate social responsibility. Concerning the world for the environment, various companies choose to adopt ecological business practices. Companies need to adopt this approach because, in this way, the company can protect the environment and reduce pollution [15]. Sustainable innovation (green innovation) can be applied to designing products, processes, and technologies related to energy-saving or in processes that affect energy efficiency.

The definition of green product innovation is a product that is related to environmental innovation, including innovation in a product that is new or that offers a significant increase in basic characteristics, technical specifications, embedded software, or any components or materials and products introduced are

involved in energy saving, reduction emissions, product recycle [16].

The definition of green process innovation is a process that is considered to occur when a new or significantly improved production process has been implemented, the distribution of new methods or support activities for the change and its services and the process is related to energy saving, pollution prevention, waste recycling, or no toxicity, lower energy consumption, recycle, reuse and reproduce materials and use cleaner technology to save and prevent pollution [16].

### 3. Conceptual Framework

Referring to previous theory and research, the following figure is a conceptual framework for this research regarding the flow of thinking about the influence of green organizational culture on organizational performance and green competitive advantage through green innovation.

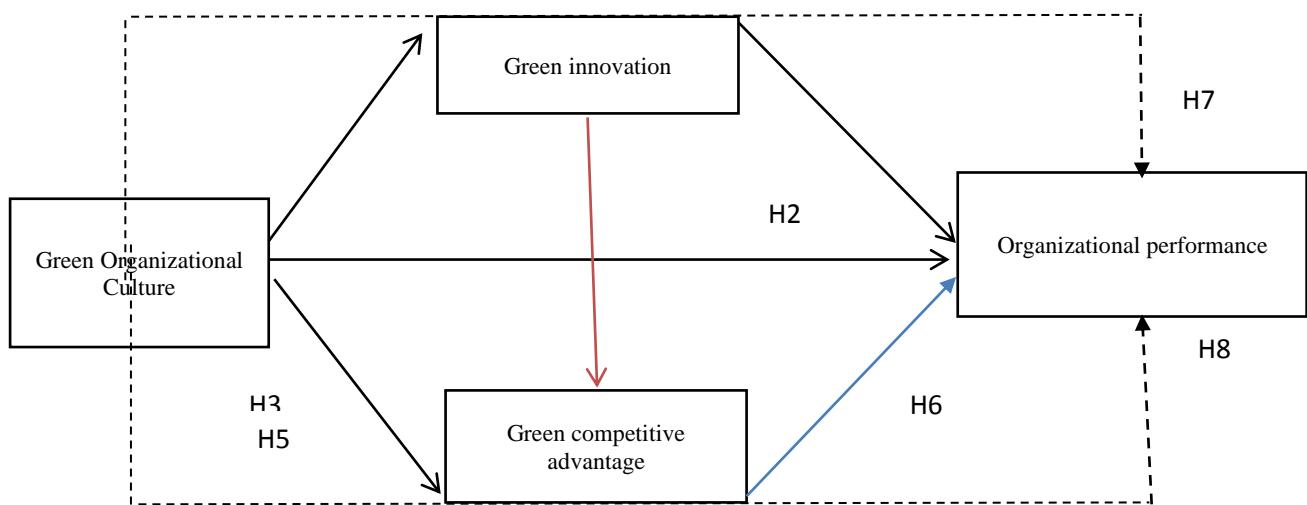


Fig. 1 Conceptual framework model

## 4. Research Methods

This study uses a quantitative method that analyzes the effect of each hypothesis determined by the researcher based on the gap research described in the introduction. The nature of hypothesis testing is research that predicts a logically estimated relationship/influence between two or more variables expressed in the form of testable statements [17]. The object of research is a company engaged in the manufacturing industry. The analytical method used is the Structural Equation Model (SEM). Data collection techniques were carried out with structured interviews using a questionnaire.

### 4.1. Population and Sample

The research object is a company engaged in the manufacturing industry, as many as 26 manufacturing companies. The research population is the level of

leadership (CEO, Manager). The sampling technique used purposive sampling, namely with the following criteria:

1. Level determinants of policies/company leaders, namely CEO, General Manager, Manager
2. Experts, namely the vice president and experts (experts related to the environment)

## 5. Results and Discussion

### 5.1. Respondent Demographics Data

The characteristics of respondents based on the position were more dominated by respondents in this study who served as managers as many as 89 people or 48.1%, followed by respondents who had positions as vice president as many as 44 people or 23.8%; general manager as many as 23 people or 12.4%; 18 people or 9.7% of the expert staff and the lowest number of

respondents who served as CEO were 11 people or 5.9%.

The majority of respondents were over 45 years old, as many as 67 people or 36.2%, followed by respondents aged 41 years to 45 years as many as 51 people or 27.6%; aged 31 years to 40 years as many as 38 people or 20.5%; age 26 years to 30 years were 21 people or 11.4% and the lowest frequency of respondents age was 21 years to 25 years as many as 8 people or 4.3%.

## 5.2. Structural Equation Model and Hypothesis Test Results

### 5.2.1. Structural Equation Model Output

Furthermore, we propose a full SEM model testing the parameter  $\lambda$  (loading factor/indicator coefficient) measurement in both exogenous and endogenous models. This test is intended to determine whether or not each latent variable (construct) indicator is strong.

This analysis measures the t-value and the structural equation coefficient. By testing whether the t-value is greater than 1.96. The t-value of the coefficient/parameter and the value of the coefficient/parameter (estimate) can be seen in the following figure:

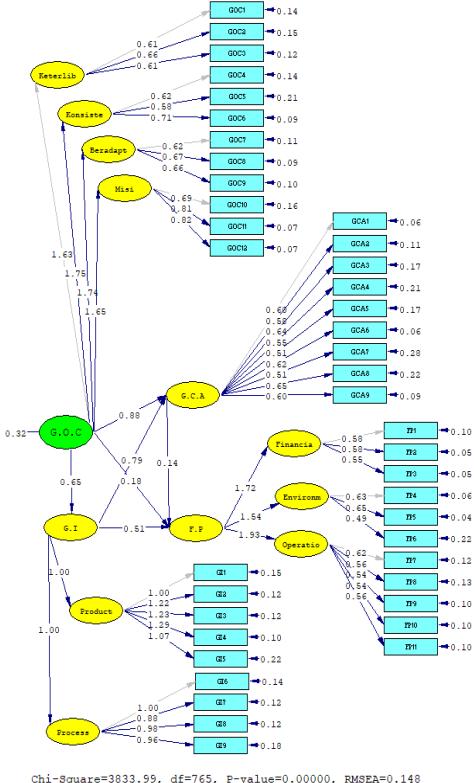


Fig. 2 Structural model estimates (Results of treatment with LISREL 8.8)

The model estimates image displays the complete model path diagram with the numbers, which results from non-standardized estimates.

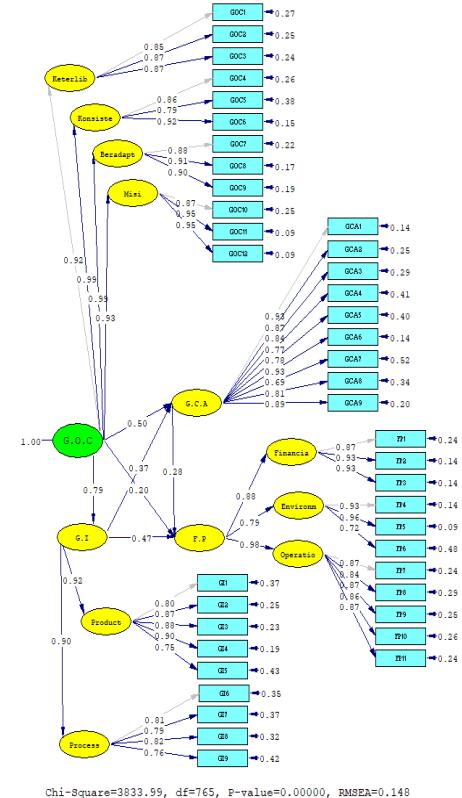


Fig. 3 Structural model standardized solutions (Results of processing with LISREL 8.80)

The standardized solutions model image shows the complete model path diagram with the numbers, which results from standardized estimates.

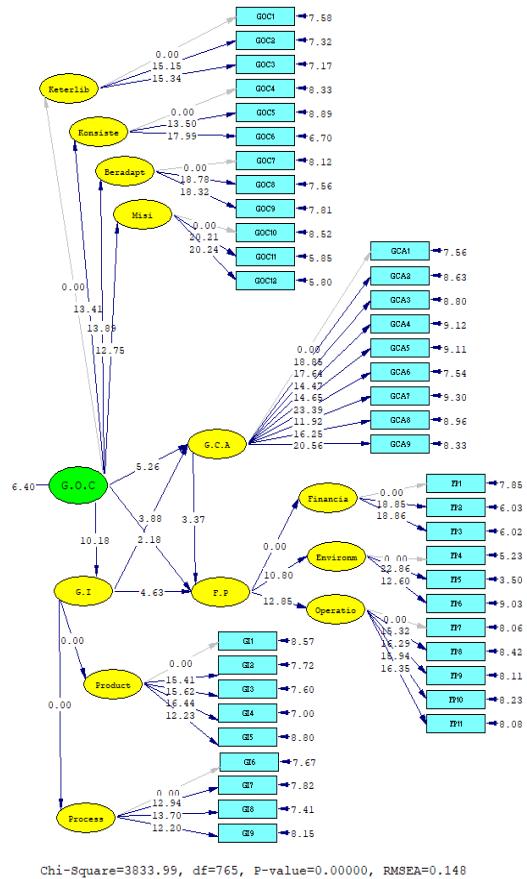


Fig. 4 Structural models t-values (Results of processing with LISREL 8.80)

The t-values model image displays a complete model path diagram with numbers representing the t-values of each estimated number.

In the results of data analysis using the Structural Equation Model (SEM) method and by using the LISREL 8.80 application software processing tool, a summary of the model suitability index is obtained as below:

Table 1 Model suitability index (Processed data)

Goodness of fit index	Criteria (cut-off value)	Result	Conclusion
X <sup>2</sup> - Chi-square	Small expected	3833.99	
Significance probability	< 0,05	0.000	Model not fit
RMSEA	≤ 0,1	0.148	Model not fit
NFI	≥ 0,90	0.92	Model fit
NNFI	≥ 0,90	0.93	Model fit
PNFI	≥ 0,90	0.90	Model fit
CFI	≥ 0,90	0.93	Model fit

Table 2 Structural model equations (Processed data)

#### Structural Equations

$$G.C.A = 0.88 * G.O.C + 0.79 * G.I, \text{ Error var.} = 0.33, R^2 = 0.67$$

(0.17)	(0.20)	(0.045)
5.26	3.88	7.31

$$F.P = 0.14 * G.C.A + 0.18 * G.O.C + 0.51 * G.I, \text{ Errorvar.} = 0.056, R^2 = 0.78$$

(0.043)	(0.082)	(0.11)	(0.011)
3.37	2.18	4.63	5.00

#### 5.3.1. Coefficient or Parameter Values

This value is a previously estimated value used as a comparison of the t-value to test the study's hypothesis. The results of this evaluation can be summarized in table – 1 below.

#### 5.4. Direct Influence

Referring to Table 2, the research hypothesis testing will be described.

##### Hypothesis 1: The influence of green organizational culture on green innovation.

The first hypothesis aims to examine the influence of green organizational culture on green innovation. The research hypotheses to be tested are as follows:

*H<sub>0</sub>1:* It is suspected that there is no positive influence of green organizational culture on green innovation.

*H<sub>a</sub>1:* It is suspected that there is a positive influence on green organizational culture on green innovation.

Table 2 shows that the coefficient of organizational culture green is positive at 0, 65 with a p-value value of 0.0 00 (0, 0000 /2) is small compared with  $\alpha = 0.05$ . The decision Ha1 received means there is positive and significant Green organizational culture towards green innovation. The positive influence shows that the better implementation of organizational culture green then green innovation will be even better.

IFI	≥ 0,90	0.93	Model fit
RFI	≥ 0,90	0.91	Model fit

Table 1 above shows six model suitability indices obtained that have a good fit index, namely: NFI, NNFI, PNFI, CFI, IFI, and RFI. Thus, it can be continued in the next analysis.

#### 5.3. Hypothesis Testing for Structural Equation Models

Furthermore, based on Fig. – 2 and Fig. – 3, some results contain information about the estimation results of structural equations or equations from the structural model. This section deals with evaluating coefficients or parameters that indicate a causal relationship or the effect of one latent variable on other latent variables. The resulting structural model equation is shown in Table 2 below.

##### Hypothesis 2: The influence of green organizational culture on organizational performance.

The second hypothesis aims to examine the effect of green organizational culture on organizational performance. The research hypotheses to be tested are as follows:

*H<sub>0</sub>2:* It is suspected that there is no influence of green organizational culture on organizational performance.

*H<sub>a</sub>2:* It is suspected that there is an influence of green organizational culture on organizational performance.

Table 2 shows that the coefficient Culture green organizations are positive at 0, 18 with a p-value value of 0.0 133 (0, 029 /2) is small compared with  $\alpha = 0.05$ . The decision Ha2 received means there is positive and significant green organizational culture on organizational performance. The positive influence shows that the better implementation of the organizational culture of green, the better the organization's performance.

##### Hypothesis 3: The influence of green organizational culture on green competitive advantage.

The third hypothesis aims to examine the effect of green organizational culture on green competitive

advantage. The research hypotheses to be tested are as follows:

*Ho3:* It is suspected that there is no positive influence of green organizational culture on green competitive advantage.

*Ha3:* It is suspected that there is a positive influence of green organizational culture on green competitive advantage.

Table 2 shows that the coefficient of organizational culture green is positive at 0, 88 with a p-value value of 0.0 00 (0, 000 /2) is small compared with  $\alpha = 0.05$ . The decision HA3 received means there is positive and significant green organizational culture against green competitive advantage. This positive influence shows that the better the implementation of green organizational culture, the higher the green competitive advantage will be.

*Hypothesis 4: Effect of green innovation on organizational performance.*

The fourth hypothesis aims to examine the effect of green innovation on organizational performance. The research hypotheses to be tested are as follows:

*Ho4:* It is suspected that there is no effect of green innovation on organizational performance.

*Ha4:* It is suspected that there is an effect of green innovation on organizational performance.

Table 2 shows that the coefficient of green innovation is positive at 0, 51 with a p-value value of 0.0 00 (0, 000 /2) is small compared with  $\alpha = 0.05$ . The decision Ha4 received means there is positive and significant innovation green against organizational performance. This positive influence shows that the better the implementation of green innovation, the higher the organizational performance will be.

*Hypothesis 5: Effect of green innovation on green competitive advantage.*

The fifth hypothesis aims to examine the effect of green innovation on green competitive advantage. The research hypotheses to be tested are as follows:

*Ho5:* It is suspected that there is no effect of green innovation on green competitive advantage.

*Ha5:* It is suspected that there is an effect of green innovation on green competitive advantage.

Table 2 shows that the coefficient of green innovation is positive at 0, 79 with a p-value value of 0.0 00 (0, 000 /2) is small compared with  $\alpha = 0.05$ . The decision HA5 received means there is positive and significant innovation green against green competitive advantage. This positive influence shows that the better the application of green innovation, the higher the green competitive advantage will be.

*Hypothesis 6: Effect of green competitive advantage on organizational performance.*

The sixth hypothesis aims to examine the effect of green competitive advantage on organizational

performance. The research hypotheses to be tested are as follows:

*Ho6:* It is suspected that there is no effect of green competitive advantage on organizational performance.

*Ha6:* It is suspected that there is an influence of green competitive advantage on Organizational.

Table 2 shows that the coefficient competitive edge green is positive at 0, 79 with a p-value value of 0.0 00 (0, 000 /2) is small when compared with  $\alpha = 0.05$ , then the decision Ha6 received means there is positive and significant green competitive advantage over organizational performance. This positive effect shows that the higher the application of green competitive advantage, the higher the organizational performance will be.

## 5.5. Indirect Influence

*Hypothesis 7: The influence of green organizational culture on organizational performance is mediated by green innovation*

Hypothesis seven aims to examine the indirect effect of green organizational culture on organizational performance mediated by green innovation. The research hypotheses are as follows:

*Ho7:* Allegedly, there are pengaruh budaya green organizations to perform organization mediated by green innovation.

*Ha7:* It is suspected that there is an influence of green organizational culture on organizational performance mediated by green innovation.

Table 2 shows that the coefficient for the total effect is positive at 0, 33 with a p-value value of 0.0 00 is small compared with  $\alpha = 0.05$ . The decision Ha7 acceptable means there is significant green organizational culture on performance organization mediated by innovation green. This positive influence shows that the better the green organizational culture mediated by the application of green innovation will impact improving organizational performance.

*Hypothesis 8: The influence of green organizational culture on green competitive advantage is mediated by green innovation.*

Hypothesis seven aims to examine the indirect effect of green organizational culture on green competitive advantage mediated by green innovation. The research hypotheses are as follows:

*Ho8:* It is suspected that there is no influence of green organizational culture on the green competitive advantage that is mediated by green innovation.

*Ha8:* It is suspected that there is an influence of green organizational culture on the green competitive advantage, which is mediated by green innovation.

Table 2 shows that the coefficient for the total effect is positive at 0, 51 with a p-value value of 0, 0003 is small compared with  $\alpha = 0.05$ . The decision Ha7 acceptable means significant green organizational

culture towards a competitive edge green mediated by innovation green. The positive influence shows that green organizational culture mediated by green innovations will impact organizational performance.

## 6. Discussion of Research Results

### 6.1. The Influence of Green Organizational Culture on Green Innovation

The first hypothesis aims to examine the influence of green organizational culture on green innovation. The results show that there is a positive and significant influence on green organizational culture on green innovation. The positive influence shows that the better implementation of organizational culture green than green innovation will be even better.

### 6.2. The Influence of Green Organizational Culture on Organizational Performance

The second hypothesis aims to examine the effect of green organizational culture on organizational performance. The results showed that there was a positive and significant influence on green organizational culture on organizational performance. The positive influence shows that the better implementation of organizational culture green than the organization's performance, the better.

### 6.3. The Influence of Green Organizational Culture on Green Competitive Advantage

The third hypothesis aims to examine the effect of green organizational culture on green competitive advantage. The results showed a positive and significant influence on green organizational culture on green competitive advantage. This positive influence shows that the better the implementation of green organizational culture, the higher the green competitive advantage will be.

### 6.4. The Influence of Green Innovation on Organizational Performance

The fourth hypothesis aims to examine the effect of green innovation on organizational performance. The results showed that there was a positive and significant effect of green innovation on firm performance. This positive influence shows that the better the implementation of green innovation, the higher the organizational performance.

### 6.5. Effect of Green Innovation on Green Competitive Advantage

The fifth hypothesis aims to examine the effect of green innovation on green competitive advantage. The results showed that there was a positive and significant effect of green innovation on green competitive advantage. This positive influence shows that the better the application of green innovation, the higher the green competitive advantage will be.

A proactive environmental strategy through process innovation and product innovation has a positive effect on organizational competitiveness. With an emphasis on a resource-based view, it considers green innovation to be a capability that increases the competitiveness of profits.

### 6.6. The Effect of Green Competitive Advantage on Organizational Performance

The sixth hypothesis aims to examine the effect of green competitive advantage on organizational performance. The results showed that there was a positive and significant effect of green competitive advantage on organizational performance. This positive effect indicates that the higher the application of green competitive advantage, the higher the organizational performance.

The success of green innovation makes it difficult for competitors to replicate the product. That results in competitiveness that improves performance both in financial, operational, and environmental performance. A company with a higher competitive destination for performing well in the aspects of growth and finance and the environment's performance will generate sustainable performance.

### 6.7. Indirect Influence

#### 6.7.1. The Influence of Green Organizational Culture on Organizational Performance Is Mediated by Green Innovation

Hypothesis seven aims to examine the indirect effect of green organizational culture on organizational performance mediated by green innovation. This positive influence shows that a better green organizational culture mediated by green innovation will impact improving organizational performance. Green innovation plays a mediating role between environmental ethics and providing a competitive advantage. A culture based on values that ensure economic sustainability, when environmentally-friendly innovation is promoted within the company, will become a defining feature. Its results are seen in the company's performance. This research supports the research of Machado & Avila [18].

#### 6.7.2. The Influence of Green Organizational Culture on Green Competitive Advantage Is Mediated by Green Innovation

Hypothesis seven aims to examine the indirect effect of green organizational culture on competitive advantage mediated by green innovation. This positive influence shows that a better green organizational culture mediated by green innovation will impact improving organizational performance.

Green organizational culture can also create suitable conditions for green innovation by ensuring the allocation of green value within the organization. On

the other hand, green innovation can bring a competitive advantage to organizations through product differentiation and high benefits derived from low costs. In addition, green innovation plays an important role in mediating the effect of green innovation on competitive advantage. If the company wants to gain a competitive advantage, company management must invest in environmentally friendly innovations.

## 7. Conclusion, Managerial Implication and Future Research

### 7.1. Conclusions

Research on green culture's influence on organizational performance and green competitive advantage is mediated by green innovation. It can be concluded that based on the results of data processing and analysis carried out and discussed in previous chapters, it is as follows:

1. There is a positive and significant influence of green organizational culture on green innovation, so the results of this study support hypothesis 1
2. There is a positive and significant influence of green organizational culture on organizational performance, so that the results of this study support hypothesis 2
3. There is a positive and significant effect of green organizational culture on green competitive advantage, so that the results of this study support hypothesis 3
4. There is a positive and significant effect of green innovation on organizational performance, so that the results of this study support hypothesis 4
5. There is a positive and significant effect of green innovation on green competitive advantage, so that the results of this study support hypothesis 5
6. There is a positive and significant effect of green competitive advantage on organizational performance, so that the results of this study support hypothesis 6
7. There is a positive and significant effect of green organizational culture on organizational performance mediated by green innovation, so that the results of this study support hypothesis 7
8. There is a positive and significant effect of green organizational culture on the green competitive advantage that is mediated by green innovation so that the results of this study support hypothesis 8

### 7.2. Implications

#### 7.2.1. Theoretical Implications

The research results prove that green organizational culture practices have a positive impact on green competitive advantage and organizational performance. With global issues that require companies to be responsible for maintaining economic and

environmental sustainability, it encourages companies to make green innovations within the company's scope. So that it can produce products that are environmentally friendly, highly competitive, and also strive to reduce long-term production costs to produce good company performance in economic, operational, and environmental aspects.

#### 7.2.2. Managerial Implications

1. Companies must implement a green strategy as well as implement green management for production processes and services. The culture of developing a green strategy is becoming increasingly dominant. A green strategy needs to be directed towards pursuing long-term programs that prioritize organizational performance, including economic, operational, and environmental aspects. One of the things that need to be a priority is to support the use of new technology by implementing a green strategy to strengthen the practice of technology. Green technology will make the company exist and advance in the medium and long term. As well as making future generations of employees understand and apply green technology.

2. Companies facing global competition and maintaining a green competitive advantage require a green organizational culture, seeing the role of green organizational culture, which is very important for the company. The green organizational culture built by the company is also a green organizational culture that its competitors do not easily imitate.

3. Forge partnerships to support corporate green innovation:

I. Involving the surrounding community regarding the management and processing of recyclable waste

II. Collaborating with formal and non-formal educational institutions by providing socialization of green strategies, among others, through green innovation. In recruiting new employees, companies can use the talent scouting system where one indicator is an understanding of green innovation.

#### 7.2.3. Suggestions for Further Research

1. Adding another variable that theoretically establishes the relationship between employees and companies, Managerial Environmental Concern (MEC) and Absorptive capacity [19], [20].

2. In this study, to test the hypothesis is to measure the influence of variables so that it is suggested for future research to conduct studies related to the influence between the dimensions of the variables forming green organizational culture, green innovation, green competitive advantage, and organizational performance.

3. Adding the object of research, not only in the manufacturing industry sector but also in other sectors, including oil and gas, mining, property, etc.

4. It is conducting a similar study but differentiating between industries with applied green methods and those that have not applied them. The phenomenon of company performance can be seen from economic, operational, and environmental aspects.

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