
Green Innovation, Green Supply Chain Management, Green Intellectual Capital and Green Human Resources Management Toward Environmental Performance

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Abstract

This research aims to analyze the role of green innovation, green supply chain management, green intellectual capital and green human resources management on environmental performance. This research includes survey research conducted on company employees in Central Java. The population in this study were company employees in Central Java. The sampling method used by researchers is purposive sampling, namely sampling with the aim of because the respondents sampled are employees who work in companies that apply environmentally friendly principles, so the total sample in this study is 150 employees. Data collection techniques use questionnaires and observation. The data analysis technique uses research instrument tests which include validity tests and reliability tests. Classic assumption tests include heteroscedasticity tests, normality tests and multicollinearity tests. Hypothesis testing includes multiple linear regression analysis, t test, F test and analysis of the coefficient of determination (R^2). Green innovation, green supply chain management, green intellectual capital and green human resources management have a positive and significant effect on environmental performance. The coefficient of determination test results show that the R^2 value is 0.691, meaning that environmental performance is influenced by Green innovation, green supply chain management, green intellectual capital and green human resources management by 69.1% while the remaining 30.9% is influenced by other variables outside the research model. This is for example management commitment and environmental management system.

Keyword: green innovation, green supply chain management, green intellectual capital, green human resources management, environmental performance

Introduction

The organizations of all types and sizes are increasingly paying attention to the environmental impacts of their activities, products and services because this is in line with increasing attention to improving environmental quality. The environmental performance of an organization is increasingly important for related parties in the internal and external environment.

The good environmental performance requires organizational commitment to take a systematic approach and continuous improvement in an environmental management system. The economic benefits that can be obtained from implementing an environmental management system are having a framework for balancing and combining economic and environmental interests. These benefits can also be identified to demonstrate to interested parties the value of good environmental management to the organization.

The environmental performance is the effort made by a company to create a good (green) environment, through controlling environmental aspects such as environmental policies, environmental targets and environmental targets. Environmental performance is the company's contribution to preserving the environment by carrying out activities and using materials that do not damage the environment. According to Law no. 32 of 2009 concerning Environmental Protection and Management, states that environmental performance is a form of environmental protection and management through systematic and integrated efforts carried out to preserve environmental functions and prevent environmental pollution and/or damage which includes pollution, utilization, control, maintenance, supervision and law enforcement. Environmental performance is a company's ability to preserve the environment by controlling its environmental aspects. Environmental performance is measured by the company's achievements following the PROPER program (Company Performance Rating Assessment Program in Environmental Management) which is one of the efforts made by the Ministry of the Environment (KLHK) to encourage company structuring in environmental management through information instruments. The environmental policy establishes principles as a basis for the organization to take action. Policies define the level of responsibility and performance required by the organization, so all subsequent actions will be assessed against these policies. Policies should be appropriate to the environmental impact of the organization's activities, products and services (within the scope of the established environmental management system) and should serve as a guide in developing goals and targets.

Various organizations are increasingly increasing their concern for achieving and demonstrating good environmental performance through controlling environmental impacts related to the activities, products and services of the organization concerned, carried out consistently with the organization's environmental policies and objectives. A company's ability to manage environmental performance is a strategic issue for many companies in the world, because the environment is now an asset to provide company value. As a consequence, managers are not only preoccupied with reducing working hours, improving quality and reducing costs, but also have a high concern for environmental problems.

The Companies prioritize sustainability in relation to economic growth, influenced by harmony between resource management and the environment. As a result, there are various incentives that can encourage companies to adopt practices that promote environmentally friendly manufacturing. Sustainability is considered an important factor in overcoming environmental problems in manufacturing.

Adopting green innovations allows companies to improve environmental performance, in line with environmental protection and economic development by integrating environmental goals into business targets (Ahmed et al., 2023). Green innovation conventionally involves processes and products that are environmentally friendly by reducing pollution or ecosystem damage, ultimately minimizing negative ecological impacts (Wang et al., 2021; Le, 2022). The application of environmentally friendly technological innovations has been proven to improve organizational performance because it allows companies to reduce resource use and excessive production costs and time, which in turn increases productivity and resource conservation (Flachenecker and Kornejew, 2019). This can also create a company reputation that helps increase market competitiveness by means of increasing attention to sustainability issues (Del-Aguila-Arcentales et al., 2022).

To reveal different findings, research has certainly explored mechanisms such as green supply chain management (GSCM) practices, environmental strategy, and environmental marketing, and green supply chain integration (Bu et al., 2020; Keszey, 2020; Zhou et al. , 2020). However, the focus on environmentally friendly practices such as green supply chain management as a result of environmental orientation is still insufficient (Bu et al., 2020), and the role of certain green supply chain management (GSCM) practices in mediating the relationship between environmental performance and sustainability requires more attention (Bu et al., 2020; Ahmed et al., 2023).

This shift has led to institutional pressures moderating the relationship between environmental performance practices and green supply chain management (Kalyar et al., 2020; Shafique et al., 2017; Ahmed et al., 2023). Companies seeking legitimacy are influenced by institutional pressures, which can impact business success (Micheli et al., 2020). However, the role of institutional pressures in shaping the relationship between EO practices and GSCM remains an underexplored area, especially in different institutional contexts.

Green Human Resource Management (GHRM) is an innovative approach to HR performance and functions in an organization, where the environmental context is the basis of all initiatives undertaken. Green Human Resource Management (GRHM) is stated as the involvement of all activities in the development, implementation and maintenance of a sustainable system aimed at making an organization's employees environmentally friendly (Mariana et al, 2022). Another definition was also presented by (Song & Song, 2021) Green Human Resource Management refers to policies, practices and systems that make organizational employees green for the benefit of individuals, society, the natural environment and business.

Acquah et al (2020) define GHRM as the application of HRM practices with the aim of promoting sustainable use of resources, which prioritizes environmental conservation in general which will increase employee awareness and commitment to environmental management issues in particular (Rehman Khan et al., 2020) views Green Human Resource Management as an organizational strategy to increase employee environmental awareness

Problems with implementing authentic human resources (HR) in practice. The GHRM concept provides a series of strategies for manufacturing companies in achieving both goals, namely environmental management and business goals. GHRM involves human resource practices that combine environmental policies, procedures, and operational guidelines that are in line with overall organizational goals (Yu et al., 2020)

Research Method

This research includes survey research conducted on company employees in Central Java. The population in this study were employees of companies in Central Java. The sampling method used by researchers is purposive sampling, namely sampling with the aim of taking samples because the respondents sampled are employees who work in companies that apply environmentally friendly principles, so the total sample in this study is 150 employees. Data collection techniques use questionnaires and observation. The data analysis technique uses research instrument tests which include validity tests and reliability tests. Classic assumption tests include heteroscedasticity tests, autocorrelation tests, normality tests, and multicollinearity tests. Hypothesis testing includes moderated regression analysis, t test, F test and analysis of the coefficient of determination (R^2).

Result and Discussion

1. Result

The results of testing the research instrument show that all statement items are valid in explaining the variables and are reliable. The results of the classical assumption test show that the data is normally distributed, there is no multicollinearity or heteroscedasticity disturbance. The results of the moderation analysis show the following results:

Table 1 Respondents Profile

Profile	Frequency	Percentage
Gender		
Male	85	56.7%
Female	65	43.3%
Age		
≤ 30	14	9.3%
31 – 40	54	36%
41 – 50	65	43.3%
≥ 51	17	11.4%
Educational Level		
Senior High School	13	8.7%
Bachelor	74	49.3%
Master	34	22.6%
Doctor	29	19.4%
Business was Established		
1 – 5 year	34	22.7%
6 – 10 year	54	36%
> 10 year	62	41.3%

Table 1 shows that the profile of respondents based on gender is mostly male, 85 respondents (56.7%). The age of most respondents was between 41 – 50 years with 65 respondents (43.3%). The highest level of education of respondents was Bachelor's degree, 74 respondents (49.3%). Most companies have been established for more than 10 years as many as 62 respondents (41.3%).

Table 2. Testing Research Instruments and Model Feasibility

Testing	Test	Vaiable	Status
Research Instruments	Validity	Product moment Green Innovation	Valid
		Product moment Green Supply Chain Management	Valid
		Product moment Green Intellectual Capital	Valid
		Product moment Green Human Resources Management	Valid
		Product moment Environmental Performance	Valid
	Reliability	Cronbach alpha Green Innovation	Reliability
		Cronbach alpha Green Supply Chain Management	Reliability
		Cronbach alpha Green Intellectual Capital	Reliability
		Cronbach alpha Green Human Resources Management	Reliability
		Cronbach alpha Environmental Performance	Reliability
Model Feasibility	Normality Kolmogorov Smirnov Test	Normal	
	Multicollinearity Nilai VIF and Tolerance	there is no multicollinearity disturbance	
	Heteroscedasticity Glejser	there is no heteroscedasticity disturbance	
	Autocorrelation Durbin Watson	there is no autocorellation disturbance	

Sources: data processed (2023)

Table 2 shows the research instrument testing using validity and reliability tests, while the model feasibility test uses data normality tests, autocorrelation tests, heteroscedasticity tests and multicollinearity tests. The research instrument test results and model feasibility can be seen in table 1. The research instrument test results using the validity test show that all research variables

are in valid and reliable status, while the model feasibility test shows that the research data is in normal status and there is no multicollinearity disturbance. heteroscedasticity and autocorrelation.

2. Hypotheses Test

Hypothesis testing is carried out using multiple linear regression models. The results of testing the multiple linear regression model can be seen in the table below:

Table 3. Multiple Linnier Regression Model

Variable	β	SE	t value	p value
Constant	0.667			
Green Innovation	0.397	0.067	5.860	0.000
Green Supply Chain Management	0.239	0.059	4.016	0.000
Green Intellectual Capital	0.210	0.100	2.090	0.003
Green Human Resources Management	0.489	0.066	7.324	0.000
R Square	: 0.701	F Test : 61.711		
Adjusted R Square	: 0,691	Sig. F: 0.000		

Sources: data processed (2023)

The variables green innovation, green supply chain management, green intellectual capital and green human resources management have a significance value of 0.000; 0,000; 0.000 and 0.000 < 0.05, it can be concluded that the variables green innovation, green supply chain management, green intellectual capital and green human resources management have a significant influence on environmental performance.

The coefficient of determination is 0.691, this means that 69.1% of the variation in environmental performance is explained by variations in changes in green innovation, green supply chain management, green intellectual capital and green human resources management. while the remaining 30.9% of environmental performance is explained by other variables not studied, for example management commitment, environmental management system.

3. Discussion

The results of this research show that green innovation has an effect on environmental performance. These results show that environmentally friendly innovation is related to innovative production processes that can reduce environmental pollution (Ma et al, 2021). To create innovative products, organizations focus on process modification and design modification by integrating ecological aspects (Xie et al., 2019). Green innovation reduces emission intensity at the end of the production process and controls its negative impact on the environment by paying attention to the latest processes and equipment used (Cai and Li, 2018). Green innovation also helps organizations to reduce water consumption, use resources efficiently, consume less

energy, and replace fossil fuel consumption with bioenergy (Kivimaa and Kautto, 2010). To gain a competitive advantage in the industry, most organizations reduce production costs and improve product quality. This can occur when organizations bring innovation into the organization's production processes (Tang et al., 2018). An organization can differentiate itself from other organizations by achieving an environmentally friendly image in the market which ultimately leads the organization to competitive advantage (Li et al., 2020). Organizations can maintain a green image by reducing environmental pollution and improving product quality. To achieve this goal green innovation is the best solution (Tu and Wu, 2021).

Green supply chain management influences environmental performance. These results indicate that environmentally friendly supply chain management (GSCM) practices include a series of sustainability-oriented actions implemented throughout the supply chain covering the life cycle of environmentally friendly products from the design stage to post-sales. This practice integrates environmental considerations in supply chain management (Micheli et al., 2020). Recent studies on green supply chain management are being conducted as social members' awareness and interest in environmental issues increases (Blome et al., 2017). Green supply chain management is considered as a combination of environmentally friendly purchasing, environmentally friendly materials, environmentally friendly distribution, and environmentally friendly logistics (Dong et al., 2021). In other words, green supply chain management is recognized as an important company strategy to increase environmentally friendly sustainability and provide a signal to shareholders because it can achieve company goals, namely profits and developing markets along with reducing environmental risks and impacts (Micheli et al., 2020). Thus, the ultimate goal of implementing environmentally friendly supply chain management is to reduce costs and resource consumption, reduce environmental pollution through green products, improve the company's environmental and social performance, and achieve economic performance through these results (Kazancoglu et al., 2018). Previous research streams on green supply chain management are mainly studied together with green innovation, information sharing, and firm performance (Dong et al., 2021; Teixeira et al., 2016). Green supply chain management which consists of internal environmental management, environmentally friendly purchasing and environmentally friendly processed products has a positive and improving effect on environmental performance (Seman et al., 2019).

Intellectual capital is a vital organizational asset that can add value to achieve organizational goals. Intellectual capital can be increased through training and development programs, organizational knowledge dissemination capabilities (Andersen and Kragh, 2015). Intellectual capital is a company's resources based on company experience, knowledge, and ability to organize and utilize skills and increase employee efficiency (Huang et al., 2021; Nguyen and Doan, 2020). On the other hand, Green Intellectual Capital (GIC) involves policies, skills and individual abilities to carry out environmental conservation efforts efficiently (Ali et al., 2021; Jirakraisiri et al., 2021; Yusliza et al., 2020). Employees who have good environmental knowledge tend to be willing to pay more attention to a sustainable business environment (Asiaei et al., 2023), so this policy is an addition to green human capital skills. On the other hand, many experts believe that the competitiveness of an organization depends on performance. In a

business environment full of uncertainty, companies must strive to target increasing competitive capabilities by optimizing the management of environmental issues so as to create an increase in green human capital which can have an impact on improving the company's environmental performance (Kuo et al., 2022; Sun et al., 2021).

Promote a culture of environmental performance, environmental-related criteria are included in employee performance evaluations. Environmentally friendly performance assessment is important for achieving environmental performance goals because it offers a strategy for measuring employee performance based on environmentally friendly criteria (Jabbour, 2011). Assessment of employee environmental performance aligns behavior, ensures responsibility, and maintains focus on environmental goals, which in turn improves organizational goals of environmentally friendly performance (Guerci et al., 2016). Compensation plays an important role in motivating and gaining commitment from employees. Compensation is associated with green consciousness, it minimizes unacceptable behavior and reinforces acceptable behavior (Jackson et al., 2011).

Improved an organization's environmental performance, it is important to introduce a reward system that includes financial and non-financial compensation for employees (Jabbour, 2011). With the right green reward system, companies benefit from environmental performance. Therefore, organizations can achieve superior environmental performance through Green human resources management, because it creates environmentally friendly employees by concentrating on environmentally friendly recruitment and selection, environmentally friendly training, green performance assessment, and environmentally friendly compensation. Green human resources management includes environmentally friendly human resource activities that contribute to increased efficiency, reduced costs, and superior environmental performance. Several previous studies have shown a relationship between Green human resources management and environmental performance (Latan et al., 2018; Ren et al., 2018; Yusoff et al., 2020). Kim et al (2019) and Pham et al (2020) show that Green human resources management influences the environmental performance of the hotel industry.

Conclusion

The results of this research show that green innovation has an effect on environmental performance, especially in relation to environmentally friendly innovation in innovative production processes that can reduce environmental pollution. Green supply chain management influences environmental performance, especially in relation to reducing costs and resource consumption, reducing environmental pollution through green products so that it can improve environmental performance. Green intellectual capital has a positive and significant effect on environmental performance, especially in relation to employee policies, skills and abilities to carry out environmental conservation efforts efficiently. Green human resources management has a positive and significant effect on environmental performance, especially related to environmentally friendly recruitment and selection, environmentally friendly training, green performance assessment, and environmentally friendly compensation.

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