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REVEALING THE IMPORTANCE OF GREEN COLLABORATION IN GREEN INNOVATION: ENTREPRENEURIAL MARKETING PERSPECTIVE

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Abstract

Green innovation (GI) is often perceived as unnecessary for companies, while the amount of packaging waste with the potential to pollute the environment continues to increase significantly. Without extraordinary action, this will lead to contamination of ecosystems and a threat to human health. Therefore, this research aimed to explore the role of green collaboration (GC) in enhancing innovation and improving company performance (CP), with a particular emphasis on how the synergy of innovation and collaboration serves as a dimension of entrepreneurial marketing (EM). A quantitative method was used through a survey of 120 division heads and company owners in Indonesia. Moreover, data analysis was conducted using Structural Equation Model (SEM) method with Partial Least Squares (PLS) method. The results showed that both green innovation and green collaboration had a positive impact on company performance. However, green collaboration did not demonstrate a statistically significant moderating effect. This suggests that companies need to consider other strategic alliances to maximize the synergy between green innovation and green collaboration. The results can serve as a guide for companies in designing effective innovation and collaboration strategies to achieve sustainability and competitive advantage. However, a key limitation is that the strategy may not be applicable in another industry.

Keywords: Green innovation, green collaboration, business strategy, entrepreneurial marketing.

Introduction

Various companies are currently confronted with the need to reduce environmental impact without sacrificing business performance. To address this challenge, green innovation (GI) has become a primary focus in modern business strategies, specifically in companies' efforts to achieve sustainability and competitive advantage. This innovation can offer solutions that not only help achieve sustainability goals but also enhance operational efficiency and market competitiveness (Liu et al., 2024; Novitasari & Agustia, 2021; Sun & Sun, 2021). However, improper implementation often leads to obstacles in terms of costs, risks, and internal resistance (Khan & Hinterhuber, 2024). Green innovation is increasingly recognized as a response to external pressures from stakeholders, government regulations, and others, ensuring the company's legitimacy (Li, 2022; Shao et al., 2020). Research has shown that the implementation can improve company performance (CP) through operational efficiency and a better reputation in the eyes of consumers (Liu et al., 2024; Martins et al., 2022). Therefore, it is important to identify effective ways to overcome obstacles, particularly through strategic collaboration (Uddin, 2022; Kerdpitak et al., 2019; Melander & Pazirandeh, 2019).

Despite the potential, the adoption and implementation of green innovation remain challenging and complex, particularly in developing economies such as Indonesia. The concept of "green" in Indonesia is often contentious and ambiguous, with varying interpretations across industries, policymakers, and consumers. Many businesses face financial, regulatory, and cultural barriers in transitioning toward sustainable practices. Green innovation, while beneficial, is frequently perceived as a costly investment that may not yield immediate returns (Yang & Wang, 2020; O et al., 2020).

The effectiveness of green innovation is often influenced by various factors, including collaboration between organizations. Through collaboration, companies share the resources, knowledge, and technology needed to develop environmentally friendly solutions (Dimakopoulou et al., 2023; Zhao et al., 2022; Melander & Pazirandeh, 2019)). Research has shown that strategic partnerships with suppliers, consumers, and institutions accelerate the innovation process and enhance the effectiveness of green innovation implementation. By sharing risks and resources, companies can more easily adopt green technologies and sustainable practices. This collaboration improves performance through reduced operational costs and increased efficiency (Liu, 2024; Li et al., 2023; Thitart & Hotrawaisaya, 2023).

The role of collaboration remains a subject of debate. According to some research, without effective management, collaboration can lead to conflicts and inefficiencies that hinder innovation (Dimakopoulou et al., 2023). Further investigation is still needed regarding the specific mechanisms through which collaboration affects the relationship between green innovation and company performance. Understanding factors such as the type of collaborative partners, the nature of activities, and contextual conditions that enhance or hinder the effectiveness of collaboration is very important (Suwarno et al., 2019).

The urgency of this research lies in the role of collaboration as a key lever in integrating green innovation into business strategies. Analyzing how collaboration moderates the relationship between green innovation and company performance offers valuable strategic insights for businesses looking to improve effectiveness and efficiency (Li et al., 2023; Zhu et al., 2012). In this context, investigating the moderating role of green collaboration (GC) is critically significant. The urgency of this research is also supported by the increasing consumers' attention to sustainability. With economic progress, the use of plastic packaging has also increased, which in turn generates plastic waste, leading to several challenges, particularly related to environmental impact (Humaira, 2021). According to global surveys, consumers are increasingly prioritizing products from companies that demonstrate a commitment to the environment. In this context, companies that fail to adopt green innovation may lose consumers' trust and loyalty (Almeida & Wasim (2022); Huang & Li, 2018). By investigating how green innovation may be effectively implemented through collaboration, this research can help companies understand and meet the evolving expectations of consumers (Khan et al, 2022).

Based on the discussion above, this research aimed to explore green collaboration as a moderating variable in the relationship between green innovation and company performance, particularly in Indonesia's uncertain and evolving sustainability landscape. By understanding the interplay between green innovation, collaboration, and entrepreneurial marketing, this research provides practical and theoretical insights for companies looking to develop sustainable business strategies. The results will help businesses design more effective collaboration frameworks, ensuring that green innovation efforts translate into tangible performance improvements and long-term sustainability.

Entrepreneurial Marketing

Morris and Paul (1987) integrated two key concepts namely Entrepreneurial Orientation (EO) and Marketing Orientation (MO). MO refers to an organizational marketing method based on three key constructs including competitor orientation, consumers orientation, and inter-functional coordination (Narver & Slater, 1990). In contrast, EO is characterized by three dimensions, namely risk-taking, innovation, and proactiveness (Miller, 1983). The integration of these interpretations led to the development of entrepreneurial marketing (EM) concept. The definition of entrepreneurial marketing proposed by Gardner in 1994 emphasizes the importance of innovation as the main driver of entrepreneurial behavior and marketing activities. The concept of entrepreneurial marketing has evolved from the practices of companies operating in conditions of full uncertainty. The dimensions have integrated innovative, proactive, and risk-taking methods that can address environmental challenges while simultaneously creating new business opportunities (Morris et al., 2002).

In the context of green innovation, entrepreneurial marketing established in innovative, proactive, and opportunity-oriented methods is often used by companies to create value in dynamic market conditions (Utami, 2019; Morris et al., 2002). The objective is to serve as a strong foundation for fostering and integrating environmental considerations into business strategies. By adopting entrepreneurial marketing focused on sustainability, companies can develop environmentally friendly products and process innovations. To address the expectations of environmentally conscious consumers and adhere to progressively stricter regulations (Li, 2022; Shao et al., 2020), businesses must adapt different strategies. Research by Song and Wang (2024) showed that green EO and green MO significantly influenced resilience, with innovative capabilities acting as a mediating factor. This emphasizes the important role of entrepreneurial marketing in driving green innovation and enhancing company performance in a challenging context.

In the context of green collaboration, entrepreneurial marketing can serve as a strong foundation by fostering companies to work together in developing value creation for environmentally friendly solutions (Utami & Susanto, 2020; Ind & Coates, 2013). Collaboration with suppliers and consumers in the context of green collaboration allows companies to share knowledge, technology, and resources, which are essential in developing environmentally friendly products and processes (Awwad et al., 2022; Melander & Pazirandeh, 2019). This method also helps in meeting environmental regulations and fulfilling the demands of consumers who are increasingly concerned about sustainability issues (Sharma et al., 2024). Research by

Bouguerra et al. (2022) showed that entrepreneurial marketing has a positive impact on environmental collaboration with suppliers. This research also emphasized the moderating role of employee work engagement and market environment complexity in the relationship, showing that entrepreneurial marketing can promote green collaboration through increased stakeholder engagement and adaptation to market dynamics.

Entrepreneurial marketing has traditionally allied with small and medium enterprises (SMEs) due to flexibility and innovative capabilities. Research by Utami & Susanto (2020) showed that both start-ups and scale-up companies adopt entrepreneurial marketing principles to enhance agility and drive innovation. Large companies that implement entrepreneurial marketing principles can enhance innovation capabilities and overall performance (Li et al, 2023; Cho & Lee, 2020). Furthermore, research by Miles & Darroch (2006) explained how large companies leverage entrepreneurial marketing processes to gain profits. Companies adopting the principles are not "gamblers" but strategic risk-takers who acknowledge that innovation in the present social, technological, and economic context carries inherent uncertainties and necessitates informed decision-making. A key method to managing these risks requires collaborating with partners who offer complementary capabilities, thereby contributing to risk reduction (Li et al, 2023; Miles & Darroch, 2006).

Green Innovation and Company Performance

In the contemporary business landscape, the integration of green innovation has become crucial for companies aiming to enhance performance while adhering to sustainability goals. Companies that adopt green innovation strategies not only reduce the environmental impact of operations but also enhance brand image and consumer loyalty (Liu et al., 2024; Martins et al., 2022). Research has shown that companies committed to environmentally friendly practices often gain a greater competitive advantage in the market (Thitart & Hotrawaisaya, 2023; Bacinello et al., 2019). Green innovation is commonly divided into Green Product and Process. More specifically, Green Product innovation focuses on delivering environmental benefits to end users during the use of products or services. The highest form includes eliminating the sources of pollutants (Chen et al., 2006). Conversely, Green Process innovation emphasizes environmental advantages for companies during the production of goods or services. This type of innovation typically incorporates integrated clean production technologies aimed at minimizing pollution during manufacturing and providing solutions for managing generated pollutants. "Clean process" innovation represents an advanced technological tier in Green Process Innovation, while technologies that address pollutants are considered less advanced (Hojnik & Ruzzier, 2016). These innovations can enhance company reputation, foster consumers' loyalty, and expand market share. Empirical research indicates that firms adopting green innovation tend to achieve superior financial performance (Liu et al., 2024; Cho & Lee, 2020; Li et al, 2023). In addition, green innovation potentially serves as a catalyst for new market opportunities. Companies that pioneer sustainable products or services are often distinct from competitors, attracting environmentally conscious consumers and entering trending markets. This strategic position not only drives revenue growth but also promotes long-term sustainability. Research has shown that companies with proactive green innovation strategies are better prepared to adapt to changing regulations and consumers' preferences, thereby further strengthening market position (Khan et al, 2022; Weng et al., 2015). The relationship between green innovation and company performance is not without challenges. The initial investment required to develop and implement green technology is usually very large, and the return on investment may not be immediately visible. Moreover, the success of initiatives often depends on external factors such as government regulatory support and market demand. Despite the significant potential to improve company performance, green innovation requires careful strategic planning and consideration of the broader business environment (Barforoush et al, 2021; Huang et al., 2017).

H_1: Green innovation has a positive and significant impact on company performance.

Green Collaboration and Company Performance

Utami et al. (2019) emphasized that better relationships with consumers, strategic integration with suppliers, and information sharing positively influence sustainable financial and economic performance. Green collaboration refers to partnerships between companies and external stakeholders aimed at achieving environmental sustainability goals. This collaboration often takes various forms, including joint ventures, alliances with non-governmental organizations, and partnerships with research institutions. By integrating green collaboration, companies can pool resources, share knowledge, and jointly develop sustainable ventures, thereby enhancing innovation

capabilities and overall performance (Liu, 2024; Li et al., 2023; Dimakopoulou et al., 2023). The synergistic effects can result in cost reduction, increased operational efficiency, and access to new markets. Collaborating with suppliers to develop environmentally friendly materials potentially leads to a more sustainable supply chain. Furthermore, partnerships with research institutions can accelerate the development of green technologies (Liu, 2024; Li et al., 2023; Thitart & Hotrawaisaya, 2023).

Previous research has shown that companies engaged in green collaboration often achieve better environmental and financial performance compared to those operating separately (Hu & Chen, 2023). In the global context that increasingly emphasizes the importance of sustainability, companies are required not only to adopt green innovation but also to build strong collaboration networks. Green collaboration with various stakeholders, including the government, research institutions, and local communities, expands the scope and impact of green innovation implemented (Adomako & Tran, 2022). By collaborating, companies can be more responsive to market trends and meet the expectations of consumers who are increasingly concerned about environmental issues. In addition, green collaboration can help companies overcome obstacles that may arise during the innovation process, such as technological limitations or strict environmental regulations (Li, 2022; Shao et al., 2020; Hu & Chen, 2023). Successful green collaboration requires effective communication, trust, and alignment of goals among partners. Challenges such as differences in organizational culture, resource limitations, and potential conflicts of interest may hinder the effectiveness of collaborative efforts. Maldonado and Pinzón (2023) reported that collaboration influences innovation management. Therefore, companies must carefully select partners and establish a clear framework to manage collaboration effectively, ensuring that these partnerships contribute positively to performance (Khan et al., 2021; Suwarno et al., 2019).

H_2: Green collaboration has a positive and significant impact on company performance.

Green Innovation, Green Collaboration, and Company Performance

The interaction between green innovation and green collaboration significantly affects company performance. Green innovation provides the foundation for developing sustainable products and processes, while green collaboration enhances the scope and impact of innovation. Collaborative efforts provide companies with access to external knowledge, technology, and markets, thereby enhancing the benefits of green innovation (Dimakopoulou et al., 2023). According to previous research, the positive effects of green innovation on performance are more evident when companies engage in green collaboration (Kerdpitak et al., 2019; Melander & Pazirandeh, 2019). Collaborative networks facilitate the diffusion of green technology and best practices, enabling companies to implement innovation more effectively and efficiently. Additionally, collaboration can help companies navigate the regulatory landscape and meet stakeholders expectations regarding environmental sustainability, which in turn improves performance outcomes (Hu & Chen, 2023; Li, 2022; Shao et al., 2020). Companies that can adopt green innovation quickly and efficiently are expected to have a competitive advantage over less adaptive competitors. This advantage will lead to an improvement in company performance. However, not all forms of green collaboration have the same positive impact on company performance. Factors such as the alignment of goals between collaboration partners, the level of trust, and the quality of communication play an important role in determining the success of green collaboration (Melander & Pazirandeh, 2019). Companies must strategically select collaboration partners and appropriately manage the relationships to maximize the benefits of green innovation on the company's performance (Hu & Chen, 2023).

H_3: Green collaboration has a positive and significant moderating impact on Green innovation and company performance.

Triple Bottom Line (TBL)

TBL suggests that sustainability performance can be achieved when a company balances environmental, social, and economic issues. By implementing green innovation, a company can enhance sustainability performance as well as ecological and energy efficiency (Li et al., 2018). TBL framework integrates three essential performance dimensions, namely social, environmental, and financial. These dimensions are commonly known as the 3Ps, namely people, planet, and profit. However, no universally standardized methodology exists for calculating TBL, nor is there a globally accepted set of metrics to define the categories. This flexibility is considered an advantage, as it enables the framework to be adapted to the specific needs of various entities such as businesses or nonprofits, projects or policies (infrastructure development or educational initiatives), and geographical contexts (Elkington & Rowlands, 1999). According to Slaper and Hall (2011), economic performance is

related to the flow of financial resources. Environmental performance comprises the evaluation of natural resource use and the potential impact on sustainability, covering aspects such as air and water quality, energy use, natural resource consumption, waste management, and land use patterns. To understand the long-term effects of a project or policy, trend analysis over time is essential. Finally, social performance focuses on the social aspects of a community or region, including indicators such as access to social resources, health and well-being, quality of life, and social capital. This research used TBL as the measurement of company performance.

Research Methods

This research used a survey with a quantitative method. Data collection was carried out using questionnaires and assessed with a five-point Likert scale. The survey was conducted in December 2024 and the sample size determination followed the method by Hair et al. (2017). The effect size estimation followed Cohen (1998) guideline, which stipulated a statistical power of 0.80, a significance level of 0.05, and a medium effect size of 0.15. Data were collected from 120 division heads and company owners with operational responsibilities, who use plastic packaging for products in Indonesia. Table 1 shows the demographics of respondents area.

Table 1
Respondents' Data

Province	Persons
Banten	3
Bengkulu	1
DKI Jakarta	23
Jambi	1
West Java	32
Central Java	20
East Java	25
West Kalimantan	1
East Kalimantan	2
Lampung	2
Riau	2
South Sulawesi	1
North Sumatera	7

The data were analyzed using Structural Equation Model-Partial Least Squares (SEM-PLS) to test the research model and the relationships between the variables examined. SEM-PLS was selected due to the ability to analyze complex data and accommodate the measurement of variables that are reflective and formative (Hair et al, 2021). The variables for measurement were adapted from various previous research. Green innovation variable was adopted from Wang (2019) and Muangmee et al. (2021), while green collaboration was adopted from Awwad et al. (2022). Company performance variable was adopted from Muangmee et al. (2021) and Asadi et al. (2020).

Results and Discussion

Table 2 shows the demographics of respondents. In terms of gender, 59% were male while 41% were female. Moreover, most of respondents were in the age range of 25-40 years old. About 58% were company owners and 42% were division heads.

Table 2
Respondents' Demographic

	Unit	%
Gender		
Male	71	59%
Female	49	41%
Age		
18-24	1	1%
25-30	37	31%
31-35	26	22%
36-40	29	24%
41-45	11	9%
46-50	10	8%
51-55	2	2%
>55	4	3%
SES Grade		
Middle	50	42%
Upper	70	58%

As shown in Table 3, the Cronbach alpha and Composite reliability values were above 0.70, indicating high reliability of the measurement tool (Hair et al., 2021). The examination of convergent validity includes examining Average Variance Extracted (AVE) value. AVE value above 0.50 is highly recommended (Hair et al., 2017). Based on the results, AVE values of all variables were above 0.50.

Table 3
Construct Validity and Reliability

	Cronbach's Alpha	Composite Reliability	AVE
CP	0.871	0.902	0.571
GC	0.890	0.913	0.602
GI	0.870	0.899	0.561
Moderating	1.000	1.000	1.000

Table 4 shows that all indicators correlate more highly with the respective constructs compared to the constructs from other blocks. This indicates that the model has good discriminant validity.

Table 4
Discriminant Validity

	CP	GC	GI
CP1	0.638	0.575	0.590
CP2	0.621	0.563	0.589
CP3	0.824	0.670	0.656
CP4	0.843	0.738	0.673
CP5	0.852	0.773	0.672
CP6	0.709	0.526	0.535
CP7	0.767	0.593	0.556
GI1	0.484	0.520	0.743
GI2	0.592	0.558	0.744
GI3	0.560	0.574	0.684
GI4	0.529	0.595	0.704
GI5	0.666	0.682	0.785
GI6	0.772	0.793	0.813
GI7	0.582	0.641	0.762
GP1	0.485	0.738	0.583
GP2	0.684	0.846	0.711
GP3	0.636	0.695	0.651
GP4	0.576	0.755	0.615
GP5	0.669	0.815	0.688
GP6	0.637	0.775	0.645
GP7	0.830	0.796	0.670

Hypothesis Test

Table 5 shows the significance value of the interaction effect indicated by the T statistic value of 0.028 < 1.96. Therefore, it can be concluded that, statistically, an increase in green collaboration does not have a positive effect on the relationship between green innovation and company performance.

Table 5
Path Coefficient

	Original Sample (O)	T Statistics (|O/STDEV|)	P Values
GC → CP	0.570	5.440	0.000
GI → CP	0.331	3.066	0.002
Moderating → CP	0.004	0.028	0.978

The R^2 value with and without the moderation variable in the model was also tested. The results showed that the R^2 value with the interaction variable was 0.752, while without the interaction variable, it was 0.661. The inclusion of the moderation variable led to a 0.091 increase in the R^2 value, suggesting that moderation enhances the model ability to explain variability. To assess the significance of green collaboration as a moderating variable, the effect size (f^2) calculation was carried out using the formula:

$$f^2 = \frac{(0.752 - 0.661)}{(1 - 0.752)} = \frac{0.091}{0.248} = 0.367$$

The effect size value of 0.367 > 0.350, indicates that the model falls into the large category at the structural level, according to Chin (1998). The value of $f^2 = 0.367$ suggests that the moderation effect is classified as large, signifying a practically significant moderation contribution even though not statistically significant.

Based on the results, green innovation has a positive impact on company performance. Previous research has also shown that green innovation can enhance company performance through operational efficiency, cost reduction, and improved company reputation (Liu et al., 2024; Novitasari & Agustia, 2021; Sun & Sun, 2021). In this context, companies that adopt green innovations will be able to meet environmental regulations (Li, 2022; Shao et al., 2020; Hu & Chen, 2023). The improvement in company performance through green innovation can also be explained by the increasing consumers' preference for more sustainable products, which ultimately supports revenue growth (Liu et al., 2024; Martins et al., 2022). Therefore, these results emphasize the importance of investing in green innovation strategies as one way to achieve long-term sustainability.

The results showed that green collaboration had a positive impact on company performance. Green collaboration comprising cooperation with suppliers, consumers, and other parties in the value chain, enables companies to share knowledge and resources to achieve sustainability goals (Liu, 2024; Li et al., 2023; Thitart & Hotrawaisaya, 2023).

The examination of green collaboration's moderating effect on the relationship between green innovation and company performance provides several significant results. A moderating effect value of 0.004, with a P-value of 0.978, suggests that the direct impact of green collaboration was statistically insignificant. This implies that green collaboration does not moderate the relationship between green innovation and company performance. Although green collaboration positively and significantly influences company performance, it does not sufficiently enhance the connection with green innovation. The implementation may face challenges such as misalignment of goals between collaboration partners or high coordination costs, which can reduce effectiveness as a moderator. The role of collaboration is crucial in dynamic environments (Yang et al., 2021). These results suggest that companies need to consider other strategic alliances to maximize the synergy between green innovation and green collaboration.

Conclusions and Implications

In conclusion, this research presents interesting results that deepen the understanding regarding the

impact of green innovation on company performance. Green collaboration had a positive and significant influence on company performance but did not significantly strengthen the relationship between green innovation and company performance. The results emphasize the importance of designing and implementing green collaboration with the application of appropriate strategies.

Based on these results, several recommendations can be proposed. First, companies are advised to continue promoting the implementation of green innovation by integrating environmentally friendly technologies into production and operational processes to enhance competitiveness and performance. Second, the development of green collaboration needs to focus on enhancing synergy with strategic partners, whether from the private sector, government, or society, to maximize the benefits of collaboration. Third, companies need to identify other factors that can moderate the relationship between green innovation and company performance, such as organizational culture, level of technology adoption, or regulatory support. With a more targeted approach, companies can harness the full potential of green strategies to achieve sustainability while also enhancing business performance. Future research could examine other variables and use qualitative methods to capture contextual robustness.

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