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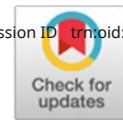
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# Green strategy for gaining competitive advantage in pharmacy: Exploring the role of green and social innovation

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## Abstract

Green strategy practices have become a major concern for many companies seeking to achieve competitive advantage. This study aims to explore the influence of green strategy on social innovation and green innovation and its impact on competitive advantage in pharmaceutical companies. A sample of 53 respondents consisting of the private sector and state-owned enterprises were selected in this study and then analyzed using a structural equation model (SEM-PLS). The results showed that the implementation of green strategy as a whole positively affects social innovation, green innovation, and competitive advantage. In addition, the role of mediation of social innovation and green innovation can strengthen the influence of green strategy on competitive advantage by increasing the company's ability to innovate sustainably, as well as responding to increasingly environmentally conscious needs. The findings of the present study contribute to the literature, especially in strategic management, by offering notions of how to achieve competitive advantage. It also provides practical implications for companies to enable them to implement steps in environmentally friendly business practices.

## Introduction

Since 2017, the global pharmaceutical industry has experienced growth of 5.8% (Pananond & Hoffmann, 2023), which are mainly attributed to pharmaceutical companies in developing countries such as the United States and Europe (Shaheer et al., 2020; Nagy et al., 2023). Developing countries such as Brazil, India, Russia, Colombia, Egypt, and China have also followed this growth of the pharmaceutical industry (Lakner et al., 2019). The market of the pharmaceutical industry is expected to continue increasing in 2024-2028 with a growth of 6.19% on account of the increasing demand for medicines (Tichy et al., 2023). While the industry continues to grow, it acknowledges that innovation remains crucial for maintaining a competitive edge. Canace et al. (2022) suggested that the pharmaceutical industry has the highest costs for research and development, which are mainly caused by their constant innovation and the creation of new drugs. Nonetheless, this pursuit for innovation and competitive advantage comes at a significant cost since it often increases waste and imposes a heavier burden on the environment.

Pharmaceutical pollution has adverse effects on both the ecosystem and human health, and this has been confirmed in the recent literature (Aulsebrook et al., 2023; Boxall et al., 2022). In their works, Ag (2024) and Wilkinson et al. (2022) have shown how many rivers around the world have been contaminated with pharmaceutical chemicals, which can pose a risk to the environment. Additionally, it can have harmful impacts on organisms and the ecosystem through behavioral changes, hormonal imbalances, and toxicity effects (Cardini et al., 2021). This condition somehow contradicts the growing consciousness of sustainability and green movements in society. As a result, pharmaceutical companies are facing demands to shift their business strategy and innovation

towards sustainability to mitigate their environmental footprint and maintain competitive advantage (Baaloudj et al., 2022; Douglas et al., 2022).

While the focus and attention on green issues keep rising, its relationship with competitive advantage remains under-researched, especially in certain contexts such as the pharmaceuticals industry (Zahid et al., 2021). Prior research has indeed attempted to explore the predictors of competitive advantage or firm performance by considering several aspects such as green strategy (Olayeni et al., 2021), product quality, green innovation (Meles et al., 2023; Jayaraman et al., 2023), and social innovation (Balaton & Varga, 2017). It is important to note that green innovation has received more attention compared to social innovation, as prior studies have pointed out its ability to reduce environmental problems and become more eco-friendly (Jayaraman et al., 2023; Bouzas-Monroy et al., 2022). For instance, the hardly-explored social innovation effort for addressing the pharmaceutical chemicals in water-based systems (Serreli et al., 2021), waste disposal initiatives (Han, 2022; Sazvar et al., 2021), as well as community engagement through innovative social strategies (Hosseini-Motlagh et al., 2021; Pattra et al., 2023) are some aspects that differ this industry with others, hence the need for exploring the specific context. However, these studies have not yet thoroughly examined how green strategy, green innovation, and social innovation interact in increasing competitive advantage for pharmaceutical firms (Khattak, 2023; Meles et al., 2023), even though they have significant role to be considered. The mediating role of both green innovation and social innovation remains unclear and still needs to be explored further (Bhatia & Kumar, 2022; Olayeni et al., 2021). This represents an important research gap, especially for pharmaceutical firms, given the specific nature of businesses associated with the need to invent new drugs and potential environmental and health effects.

To address this gap, we use the natural resource-based view (NRBV) from Hart (1995) as a theoretical lens for the study. Through NRBV, the present study draws upon how firms leverage their disparate resource endowments, such as the possession of green and social capabilities, to achieve sustainable competitive advantage. More precisely, this study will explore the influence of green strategy on social and green innovation and their mediating role for competitive advantage in the context of the pharmaceutical sector. It adds empirical evidence to the trade-off's nexus between green and social innovation from which little is currently known by analyzing these relationships in turn for their impact on firm performance. The results of this study address the need for clear directions that can help pharmaceutical companies, policymakers, and other stakeholders have a sustainable development agenda or regulatory objective while making sure that there is no price distortion to allow competition in this field.

## Literature Review and Hypotheses Development

### Natural Resource-Based View as Theoretical Lens

In the early 1990s, the discussion of resource-based theory (RBT) came to represent a major paradigm for understanding sources of firm-level competitive advantage. The talk and the significance of the valuable, rare, inimitable, and non-substitutable (VRIN) resources or capabilities initiated by Barney (1991) have led firms to evaluate their business operations. However, natural resources and environmental factors were have not yet considered in the traditional RBT or RBV. In an attempt to overcome this limitation, Hart and Dowell (2011) presented the Natural Resource-Based View (NRBV), which highlights those natural resources and environmental entire operations in creating sustained competitive advantage. According to NRBV, a firm may gain a competitive advantage in the marketplace by developing and utilizing environmental sustainability-related resources and capabilities (Hart & Dowell, 2011).

The NRBV suggested that the use of environmentally oriented resources and capabilities enables firms to reduce costs, improve operational efficiency, and lower regulatory risks (Folke et al., 2010). Hart and Dowell (2011) mentioned that there are three pillars of the NRBV, namely pollution prevention, product stewardship, and clean technology. It addresses the need for sustainability and emphasizes the integration of eco-friendly resources and capabilities, which in this study is represented by green strategy, green innovation, and social innovation. By investing in

green technologies and sustainable practices, organizations can reduce environmental impact, improve operational efficiency, and develop innovative products that meet the evolving needs of consumers (Folke et al., 2010).

The emphasis on environmental sustainability in green strategy can lead to social innovation (Han, 2022), as a culture of sustainability is developed with the employees who will work to develop innovative solutions to environmental and social challenges. On the other hand, the green strategy could also drive social innovation through collaboration with the community to identify and influence solutions for different environmental issues. The improvement of the firm image, decrease in costs, and increase in inefficiencies, as well as new market development opportunities, green strategy, as well as green and social innovation, can be sources of competitive advantage.

### **Green Strategy and Competitive Advantage**

As mentioned by Olayeni et al. (2021), a green strategy can be described as an environmentally oriented strategy that embraces lower environmental practices by incorporating green policies at all levels of organizations (Olayeni et al., 2021). It focuses on eco-friendly orientation and strives to develop products and services that are eco-friendly across all organizational levels (Dangelico et al., 2017; Olson, 2008). The organizations that implement green strategies are socially responsible in that they are able to address wider societal and ecological issues (Bhatia & Kumar, 2022). Organizations embracing a green strategy will not only be seen as being environmentally friendly but also will derive many strategic benefits that foster a competitive advantage that is sustainable over time. This enables them to achieve cost reduction and strategic benefits through operational and inventive efficiencies, as well as meeting and exceeding the consumers' want for green offerings. Furthermore, a green strategy can enable a company to differentiate itself from others in an already competitive market.

Other studies have already confirmed the existence of a positive relationship between green strategy and competitive advantage. Dangelico et al. (2017) have confirmed that green strategies are closely required for the enhancement of organizational performance. In a similar vein, Olayeni et al. (2021) confirmed that organizations that proactively implement green strategy over their competitors stand to gain a competitive advantage by satisfying market needs in ecologically acceptable ways. Furthermore, Ge et al. (2018) also pointed out that advocating a green strategy helps to lower the costs of doing business and improve efficiency, which in turn improves performance and competitive advantage.

H<sub>1</sub>: Green strategy has a positive effect on competitive advantage.

### **Green Strategy and Social Innovation**

Social innovation is the changes within the social system in the form of new collaborative practices, governance structures, and knowledge creation, which seek to meet the needs of society as well as contribute to sustainable development (Richter & Christmann, 2023). While conventional business innovation is still heavily oriented toward products, services, or organizations, social innovation is distinguished by its approach, which integrates environmental and social aspects (Kleverbeck et al., 2019). An organization that implements social innovation tends to focus on generating societal impact through inclusion, operational sustainability, and responding to social needs rather than just pursuing profits (Hirschberg et al., 2022). With this in mind, green strategy has a similar vein, which can drive social innovation in the organization, as both focus on sustainability and inclusiveness. Organization that embraces green approaches focus on reducing harm to the ecosystem and tackling larger social and ecological problems. They would often create ideas for meeting stakeholders' needs, redefine their governance structures, and respond to the society's need for sustainability, thus increasing social innovation.

Richter and Christmann (2023) pointed out how social innovation acts as an institutional change process in which organizations embrace social and environmental objectives. Additionally, Hirschberg et al. (2022) suggested that a green strategy can drive collaboration among stakeholders to build social innovation. Similar studies in the past have also noted that organizations that are able to leverage green strategy are better adapted and innovate socially in facing environmental and

societal change. Finally, Zahid et al. (2021) stated that green strategy can foster social innovation since it aligns the organizational objective with those of social and environmental sustainability.

H<sub>2</sub>: Green strategy has a positive effect on social innovation.

### **Green Strategy and Green Innovation**

Green innovation, as defined by Sun and Sun (2021), is the creation of products, services, or methods of business that have low negative impacts on the environment. These innovations include the use of sustainable raw materials, and R&D, and encompass a reduced quantity of resources and eco-based designs (Wang & Li, 2020). According to Meles et al. (2023), green innovation incorporates aspects of industrial innovation systems and green economy. The specificity of green innovation also includes increased efficiency in the use of natural resources and toxic wastes throughout the life cycle of the product (Song & Yu, 2018; Ge et al., 2018). Green strategy can be a basis for promoting green innovation since both integrate organizational goals with environmental sustainability goals. Companies that use green strategy prioritize resource efficiency, waste reduction, and eco-friendly practices, which all lead to green innovation. Implementing a green strategy can encourage companies to find more efficient ways to utilize their resources, and it motivates them to adjust their business practice with green innovation.

Existing studies highlight the positive link between green strategy and green innovation. Jayaraman et al. (2023) emphasized that a green strategy promotes environmentally friendly innovation through integrating green orientation in their product and process. It has also been confirmed that companies can create environmentally friendly innovations to reduce the negative impacts of business practices (Song & Yu, 2018; Sun & Sun, 2021). The implementation of green innovation itself can help reduce operational costs and increase the company's competitiveness (Dangelico et al., 2017). Finally, Khattak (2023) proved that a green strategy can stimulate organizations to implement green innovation in their business operations.

H<sub>3</sub>: Green strategy has a positive influence on green innovation.

### **Social Innovation and Green Innovation as Mediating Variable**

As previously mentioned, social innovation exists as a solution for addressing societal and environmental challenges through collaboration, governance, and knowledge-sharing processes (Khattak, 2023). It gives organizations the ability to alter these challenges into new opportunities for carrying out their business while also fueling demands for sustainability (Balaton & Varga, 2017). When the organization implements a green strategy, it drives social innovation as a profitable way of building organizational reputation, gaining customer loyalty, and accessing new markets. This alignment also helps the organization carry out its external social and environmental responsibilities in addition to using innovative practices to establish a competitive edge. Social innovation aligns organizational objectives with those of the community, thus facilitating the implementation of green strategies (Song & Yu, 2018). As pointed out by Khattak (2023), organizations engaged in social innovation are necessarily better adept at achieving sustainability of long-term competitive advantage.

H<sub>4</sub>: Social innovation mediates the relationship between green strategy and competitive advantage.

Chen (2008) stated that green innovation relates to developing eco-friendly products, eco-friendly processes, and eco-friendly management that minimizes the environmental burden and encourages sustainability. It is important for enabling organizations to minimize resource consumption, optimize operational efficiency, and enhance differentiation (Jayaraman et al., 2023). Green strategy can act as the catalyst for competitive advantage by driving firms to adopt sustainable practices and look for innovative solutions that are in line with environmental goals through green innovation. The study from Khattak (2023) reveals that green innovations can enhance competitive advantage through core competencies and improve the image of the company. Additionally, Ge et al. (2018) show that green innovation acts as a mediator between green strategies and competitiveness and facilitates companies to satisfy the market as well as gain sustainability.

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H<sub>5</sub>: Green innovation mediates the relationship between green strategy and competitive advantage.

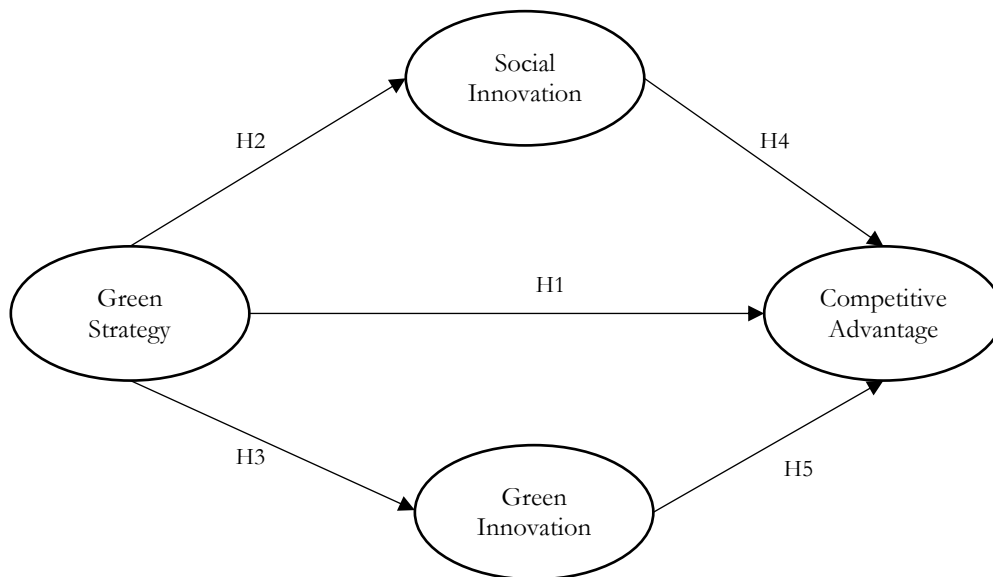


Figure 1. Conceptual Framework

## Research Methods

This research was conducted using quantitative methods to examine the relationship between green strategy, social innovation, green innovation, and competitive advantage. The study focuses on the pharmaceutical industry because of its unique intersection with environmental sustainability. This sector has a critical role in maintaining innovation for new drugs and fulfilling market demands. However, they also need to address environmental challenges for their pollution from chemicals and waste disposal.

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The target population for this study is the pharmaceutical companies that participated in the Public Disclosure Program for Environmental Compliance (abbreviated by PROPER 2024), which is a program recognized for promoting eco-friendly business practices. The sample in this study is chosen using census sampling, which is choosing the entire population as the sample. It includes 53 pharmaceutical companies, which consist of private and state-owned enterprises. The respondents for the survey were the owners of private pharmaceutical firms and managers of state-owned pharmaceutical enterprises. This ensures that they are capable of providing data about the company, understand the strategy, and are able to provide information regarding the innovation of the company itself.

The data was collected via online questionnaires distributed through Google Forms. In order to control for any common method bias (CMB) that may arise from self-reported data, the survey was designed to hide the identity of the respondents, and the items measuring independent and dependent variables were placed in different sections in order to minimize the response bias.

The Heterotrait-Monotrait (HTMT) ratio was also included in the analysis, focusing on the measurement of discriminant validity to ensure that the constructs were unique and alleviated issues regarding the data. For this analysis, research data are processed using Smart PLS 3.0 software. The researcher used the partial least square structural equation modeling (PLS-SEM) technique to examine, interpret, and corroborate the nature of the relationship between different sets of complex variables (Gudergan et al., 2008). This modeling approach adds value as it illustrates the essential components of the general model's framework (Valaei et al., 2017). There was a two-stage data analysis approach where measurement model evaluation and structural model evaluation were executed.

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As for the item measurement, regarding green strategy, four items have been developed by Olayeni et al. (2021). Social innovation is measured by five items adopted from Unceta et al. (2016). Green innovation is measured using three items adapted from Chen et al. (2008). Competitive

advantage is measured by six items adopted from Qiu et al. (2020). The sample in this study was the entire population of pharmaceutical companies registered as participants in PROPER 2024, totalling 53 respondents, including both private and state-owned enterprises. Then, a questionnaire was designed using a Google form that could be shared with respondents to obtain information related to the variables studied. A Likert point scale of 1-5 was used in this study, where point 1 indicates “strongly disagree,” and point 5 indicates “strongly agree.”

## Results and Discussion

**Table 1.** Respondents’ Characteristics

Category	Description	N	%
<i>Company Type</i>	General pharmacy	26	49.06
	Pharmaceutical products industry for humans	27	50.94
<i>Location</i>	West Java	22	41.51
	Central Java	9	16.98
	East Java	7	13.21
	Sumatra	1	1.89
	Banten	3	5.66
	DKI Jakarta	11	20.75
<i>Company Ownership</i>	State-owned enterprises	4	7.55
	Private business	49	92.45
<i>Knowledge of Environmentally Friendly Business Practices</i>	Low	0	0
	Medium	4	7.55
	High	49	92.45

Based on demographic data, pharmaceutical companies have a distribution of 26 companies with a percentage of 49.06%, almost balanced with the pharmaceutical industry for humans with 27 companies with a percentage of 50.94%. Most of the industry is distributed in West Java with 22 companies or 41.51%. Most respondents (92.45%) have high knowledge of environmentally friendly business practices, while only a small portion have moderate knowledge (7.55%). Respondents from state-owned enterprises are only 7.55%, indicating the dominance of the private sector in this sample.

### Measurement Model Evaluation

To check for construct validity and identification of the dimensions, an initial evaluation of the measurement model was performed. As all the loading factors have fulfilled the cut-off value of 0.70, there are no variables that were left out of the measurement model evaluation. Multiple tests were also carried out to ascertain that convergent validity was established including Cronbach’s Alpha, Composite Reliability (CR), and average variance extracted (AVE) analysis. As noted in Table 2, respondents’ Composite Reliability and Cronbach’s Alpha values were all greater than the threshold of 0.7, the established threshold, and it indicates a high level of reliability.

The Average Variance Extracted (AVE) value is more than 0.5 which is evidence of very good construct validity. As stated by Fornell and Larcker (1981), a construct is stated to have good discriminant validity if the square root value of AVE exceeds the correlation value between fellow constructs. In this study, we also use the Fornell-Larcker Criterion and the Heterotrait-Monotrait Ratio to assess discriminant validity. According to Fornell and Larcker (1981), a construct has discriminant validity if the square root of the AVE for that construct (as shown by diagonal values in Table 3) exceeds its correlations with other constructs. As shown in Table 3, this condition is met for all constructs in the study. Therefore, it can be concluded that all constructs have good discriminant validity. Table 3 presents that the HTMT value for all constructs falls within acceptable limits, which indicates that the constructs are empirically distinct. Together, these results proved that the constructs utilized in this study have good discriminate validity.

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**Table 2.** Measurement Model Assessment

Construct	Items	Loading	CA	CR	AVE
Competitive Advantage (CA)	CA1. The products and services provided by our company are of higher quality than the ones offered by competitors.	0.781	0.858	0.912	0.635
	CA2. Our company has stronger R&D capability compared to our competitors.	0.765			
	CA3. Our company has better management competence compared to our competitors.	0.766			
	CA4. Our enterprise is more profitable than our competitors.	0.789			
	CA5. Our company has a better corporate image than our competitors.	0.828			
	CA6. Our company has a better competitive advantage that is difficult to replace by competitors.	0.847			
Green Innovation (GI)	GI1. Our company carefully selects materials with minimal pollution and consumes the least energy and resources during product development or design.	0.868	0.879	0.924	0.802
	GI2. Our company ensures the manufacturing process effectively reduces emissions of hazardous substances and optimizes resource consumption, including water, electricity, and raw materials.	0.937			
	GI3. Our company prioritizes product designs that facilitate recycling, reusability, and decomposition to support sustainable development.	0.881			
Green Strategy (GS)	GS1. We consistently incorporate environmental concerns into our strategic planning.	0.799	0.748	0.879	0.646
	GS2. In our operations, we ensure quality is attained by minimizing the environmental impact of our processes to the greatest extent possible.	0.821			
	GS3. We make a continuous effort to align environmental goals with the broader objectives of the organization.	0.773			
	GS4. We prioritize sustainable resource management to minimize environmental degradation across all business activities.	0.820			
Social Innovation (SI)	SI1. Our company actively collaborates with local communities to develop innovative solutions that address environmental and social issues.	0.811	0.830	0.892	0.624
	SI2. Our company designs products and services that are inclusive and accessible, ensuring they meet the diverse needs of society.	0.797			
	SI3. Our company invests in programs that enhance social well-being and promote environmental sustainability simultaneously.	0.845			
	SI4. Our company fosters partnerships with stakeholders to co-create innovative approaches to solving societal challenges.	0.779			

SI5. Our company integrates social responsibility into its business operations, ensuring its practices contribute to long-term societal impact. 0.712

**Table 3.** Discriminant Validity Results

	Fornell-Larcker Criterion				Heterotrait-Monotrait Ratio			
	CA	GI	GS	SI	CA	GI	GS	SI
CA	0.767							
GI	0.399	0.896			0.456			
GS	0.404	0.306	0.756		0.488	0.354		
SI	0.545	0.361	0.729	0.773	0.620	0.391	0.589	

Note. CA=Competitive advantage; GI=Green innovation; GS=Green strategy; SI=Social innovation

### Structural Model Evaluation

In the analysis conducted, the R2 value for competitive advantage was 0.344, green innovation was 0.494, and social innovation was 0.532. R2 is said to be good if it has a minimum value above 0.10 (Dijkstra & Henseler, 2015). The structural model is fit if it has an SRMR value <0.08 and RMS-theta <0.12 (Hair et al., 2017; Dijkstra & Henseler, 2015). In the study, the SRMR value was obtained at 0.066 <0.08 and the RMS-theta at 0.105 <0.12, so the model used in the study can be said to be fit for testing. After this, the structural model is carried out to examine five hypotheses. First, GS has a direct effect on CA. Second, GS directly affects SI. Third, GS has a direct effect on GI. Fourth, SI mediates the relationship between GS and CA. Fifth, GI mediates the relationship between GS and CA. The bootstrapping method with 5000 subsamples was carried out to test the relevance of the direct relationship (Valaei et al., 2017). Table 4 presents the findings of a hypothesis test.

**Table 4.** Direct Effects Hypothesis Testing

Hypothesis	$\beta$	SD	t-value	p-value	Decision
H1. GS $\rightarrow$ CA	0.308	0.107	2.887	0.004**	Accepted
H2. GS $\rightarrow$ SI	0.729	0.053	13.748	0.000***	Accepted
H3. GS $\rightarrow$ GI	0.306	0.100	3.054	0.002**	Accepted

Note. \*p<0.05; \*\*p<0.01; \*\*\*p<0.000

CA=Competitive advantage; GI=Green innovation; GS=Green strategy; SI=Social innovation

According to the results in Table 4, all hypotheses are accepted with a significant p-value below 0.05. For H1, the green strategy positively and significantly affects competitive advantage with a coefficient ( $\beta$ ) of 0.308 and a t-value of 2.887. H2 shows that the green strategy has a very strong positive effect on social innovation, with a coefficient of 0.729 and a t-value of 13.748. For H3, the green strategy also positively and significantly affects green innovation with a  $\beta$  of 0.306 and a t-value of 3.054.

**Table 5.** Indirect Effects Hypothesis Testing

Hypothesis	$\beta$	SD	t-value	p-value	Lower Bound	Upper Bound
H4. GS $\rightarrow$ SI $\rightarrow$ CA	0.340	0.132	2.571	0.010*	0.111	0.620
H5. GS $\rightarrow$ GI $\rightarrow$ CA	0.371	0.048	7.787	0.000***	0.151	0.591

Note. \*p<0.05; \*\*p<0.01; \*\*\*p<0.000

CA=Competitive advantage; GI=Green innovation; GS=Green strategy; SI=Social innovation

In Table 5, the test results show that green strategy significantly influences competitive advantage through two mediators, namely social innovation and green innovation. In H4, the indirect effect of GS on CA via SI has a path coefficient of 0.340 with a 95% confidence interval (CI) between 0.111 to 0.620, which does not include the number 0, indicating that this relationship is significant (t-value = 2.571; p-value = 0.010). In H5, the indirect effect of GS on CA via GI has

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a higher path coefficient, namely 0.371, with a narrower 95% CI (0.151–0.591), and this relationship is highly significant (t-value = 7.787; p-value = 0.000). This shows that both mediators play an important role, but green innovation provides a stronger and more consistent mediation contribution than social innovation in connecting GS with CA. All these results show that the implementation of green strategy plays an important role in increasing competitive advantage, both directly and through social and green innovation.

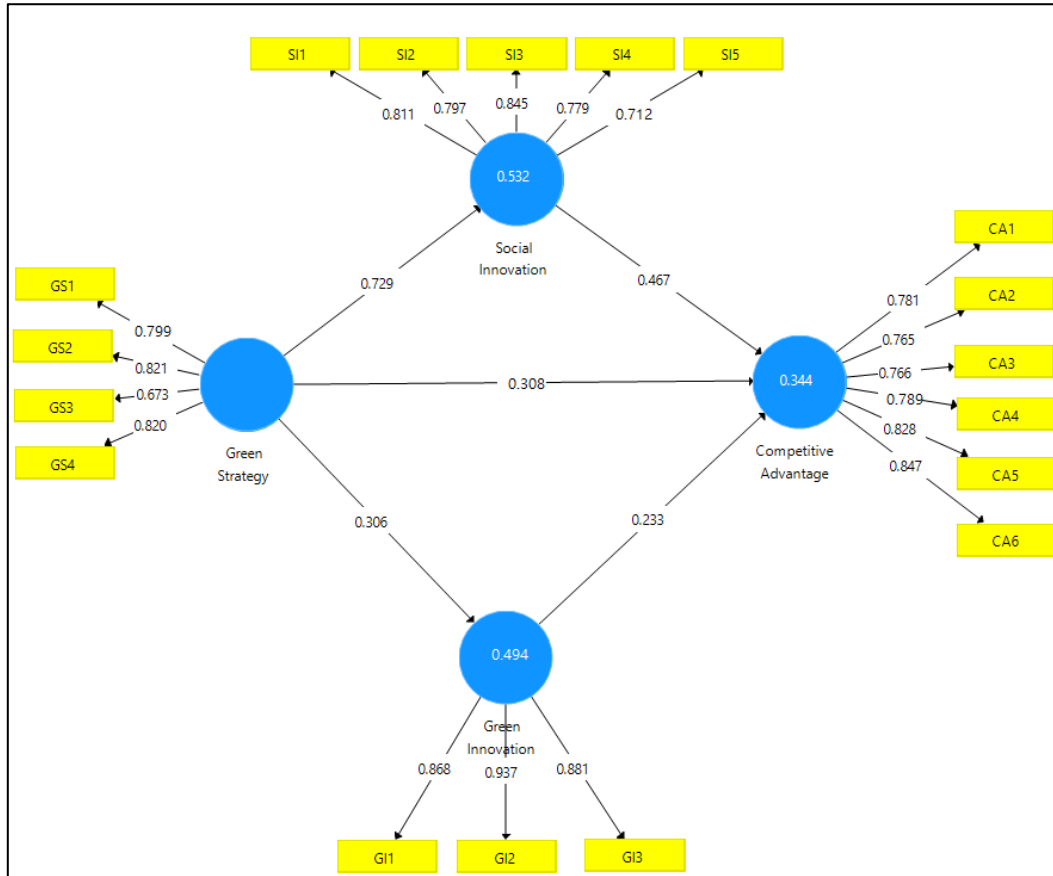


Figure 2. Structural Model Assessment

This study seeks to explore the interrelationships of green strategy on competitive advantage, social innovation, and green innovation. The green strategy is perceived as a business choice that seeks to address environmental concerns as well as improve the business’s bottom line by increasing efficiency in business operations with the aim of value addition through sustainability. According to the results of the data analysis, the findings prove that competitive advantage is motivated by the green strategy. This finding is in accordance with the research conducted by Olayeni et al. (2021) that the implementation of a green strategy carried out by companies helped them to innovate ways of reducing environmental impacts while creating products that satisfied the preferences of the customers. According to Olson (2008), another crucial factor that must be considered in implementing a green strategy is to develop a corporate image and enable opportunities for strategic partnerships with parties who have the same vision or goals so they can help the company realize the competitive advantage.

Then, this study also found that green strategy positively and significantly influences social innovation. As noted by Hirschberg et al. (2022), a critical dimension of social innovation is the facilitation of organization practices that are social in nature. Lee and Lee (2022) argued that waste management, especially in the pharmaceutical industry, relies on social strategies that are out of the ordinary and aim to address improper management. The results also illustrate that the effect of green strategy on social innovation leads to processes, products, and even results that are sustainable in nature, eco-friendly, and have a beneficial impact on society. It enables organizations

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to provide a middle ground between adopting business strategies sensitive to the environment and the provision of social solutions, thus promoting social responsibility in business.

5 Third, this study established a positive link between green strategy and green innovation in the company. These findings point toward the fact that when companies are internally or externally pressured, they are willing to adopt new ways of doing business that are greener. Green innovation can help organizations improve their performance through integrating and designing strategies that can achieve low resource utilization, as well as a low probability of causing risks and great carbon imprint. These findings are in a similar vein with Saunila et al. (2018) which states that the green strategy enables the company to prosper in its performance. Green strategy can encourage organizations to address environmental dilemmas while creating value for customers. Therefore, this study addresses the gaps in issues that the green strategy gives companies a focus on how to develop and implement environmentally friendly new ideas.

The mediating role of social innovation and green innovation in relation to the green strategy was also established in this research as a source of competitive advantage. According to the findings, companies' engagement with a green strategy can also result in social innovation, which will enable the development of sustainable social and environmental solutions. This can enhance the competitive advantage position for those companies who are able to respond to the market needs for a greener product and services while also enhancing the firm's reputation. Furthermore, through social innovation, firms can enhance their operational efficiency, create environmentally-related value addition, and improve their appeal to, among others, environmentally minded investors (Das & Sarkar, 2023; Gunawan et al., 2022).

Overall, a green strategy can lead to social innovation and green innovation, and it can be an integral factor in gaining and sustaining a competitive edge in a sustainability-oriented market. As stated by Millard and Fucci (2023), this is an act of developing new solutions that go beyond economic gain and seek to better the world and society. This innovation is significant as it motivates businesses to pursue sustainable social value creation, which enhances their competitive edge. A focused approach on both green and social innovation allows businesses to meet changing market trends which are more focused on sustainability and social responsibilities (Alkaraan et al., 2024; Kleverbeck et al., 2019). This helps firms build a better image, improve customer retention levels, and achieve differentiation that competitors find hard to replicate. A green-oriented business strategy can enhance competitive advantage by relying upon green-based innovation such as product, process, and technology development. With this innovativeness, firms will not only create a value added but as well enhance their image as leaders in environmentally friendly business practices, thus increasing their competitive advantage.

## Implication and Conclusion

Issues regarding environmental performance have received attention from society, and companies are encouraged to implement environmentally friendly business practices that are innovative to achieve competitive business performance. This study empirically supports the notion of NRBV which states that sustainability-based resources can be the key to achieving competitive advantage. It proves how green strategy not only has a direct impact on competitive advantage but also positively influences both social innovation and green innovation. By adopting a green strategy, companies can align their operations with environmental and social goals, and this creates a pathway for sustainable growth. For pharmaceutical firms, the findings highlight the importance of integrating environmental factors into their strategic planning processes. Systematic steps that can be done may include incorporating sustainability targets with business goals, investing in sustainable technologies, and creating collaborations with stakeholders to address sustainability challenges.

2 However, there are several limitations to this study, particularly in terms of scope and methodology. The use of self-report data from the owner and manager of pharmaceutical firms presents the possibility of common method bias, although steps were taken to mitigate it. The small sample size may also limit the generalizability of the results. The study affirms the role of green strategies in achieving competitive advantage; however, the trade-off of the costs and benefits of

green innovation persists as significant for the organization. Future studies ought to examine larger and cross-industry samples, with longitudinal designs capturing the potential longer effects of green strategies. Moreover, by looking at the influence of external stakeholders, such as regulators and consumers, future studies may construct a more comprehensive view of how green practices can result in a competitive advantage.

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