

Strengthening Sustainable Competitive Advantage Through Green Innovation and Social Capital: Evidence from Coastal Small and Medium Enterprises

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ABSTRACT

Coastal small and medium enterprises (SMEs) in Indonesia operate in resource-constrained environments while facing increasing environmental pressures and sustainability demands. This study aims to highlight the relationships among social capital, green innovation, and sustainable competitive advantage through green competitive advantage in coastal SMEs. A quantitative approach was employed, with data collected from 78 coastal SMEs using a structured questionnaire and analyzed through partial least squares structural equation modeling (PLS-SEM). The results indicate that social capital has a significant positive effect on sustainable competitive advantage ($\beta = 0.597$; $p < 0.001$) and green innovation ($\beta = 0.530$; $p < 0.001$). In addition, green innovation positively influences sustainable competitive advantage ($\beta = 0.372$; $p = 0.001$), highlighting its complementary role in strengthening firms' competitive positions. These findings suggest that relational resources and eco-innovative practices jointly support long-term competitiveness in coastal business contexts. The study extends the Resource-Based View (RBV) by highlighting social capital as a strategic resource that supports green innovation, and it offers practical guidance for strengthening collaborative networks and green innovation initiatives to enhance sustainability and resilience in coastal regions.

Keywords: Green Innovation; Resource-Based View; Social Capital; Sustainable Competitive Advantage; Small and Medium Enterprises

INTRODUCTION

In the era of climate change, the pursuit of sustainable competitive advantage has become a critical issue for small and medium enterprises (SMEs) in coastal areas. Organizations face unique challenges in creating and maintaining competitive advantage, including economic pressures, increased human activity, and unsustainable exploitation of natural resources (Gamage et al., 2020). The water quality is deteriorating, and there is habitat loss along with a threat of natural disasters, which have put a strain on the prosperity and well-being of these areas. Over the years, many coastal zones have seen a decrease in their productivity and competitive advantage, leading to an impact on the growth of SMEs. Meanwhile, coastal regions are among the most productive and dynamic ecosystems in the world, offering a wide range of economic and ecological benefits (Reinman, 2015). They act as homes to a range of plants and animals while also serving as hubs for economic pursuits like fishing industry activities, as well as tourism and maritime trade. Coastal regions play a critical role in supporting the national economy and providing livelihoods for millions of people (Martínez et al., 2007). As a result of this situation, a requirement arises to investigate methods that not just improve the economic performance, but also safeguard and maintain their environmental performance (Lenzun et al., 2023; Zheng et al., 2020)

This is where the concept of green innovation emerges as a crucial strategy for enhancing competitive advantage (Du et al., 2022). Green innovation refers to the development and implementation of environmentally friendly technologies and practices aimed at reducing negative environmental impacts while improving economic efficiency and productivity (Sharma, 2017). In the context of coastal regions, the application of green innovation can help address various environmental challenges, such as waste management, biodiversity conservation, and climate change mitigation (Leal-Millán et al., 2020). Although the potential of green innovation to improve sustainability in coastal areas is well recognized, its adoption by coastal SMEs is often hindered by resource constraints and limited access to advanced technologies, necessitating further exploration to understand the role of green innovation in integrating with existing social and economic elements.

This research also underscores the importance of social capital in supporting the competitive advantage of coastal SMEs. Social capital encompasses the networks, norms, and trust within a community that enable its members to collaborate more effectively in achieving common goals (Boudreax et al., 2022). In coastal regions, social capital can serve as an essential resource in building the adaptive capacity of local communities, strengthening social cohesion, and facilitating the adoption of green innovations (Morgner et al., 2020). For instance, strong community networks can promote the dissemination of sustainable practices, while social norms that support environmental conservation can enhance community awareness and participation in environmental preservation efforts. However, how social capital supports the adoption and implementation of green innovation and its impact on competitive advantage is still not fully understood.

Several studies have examined the relationship between green innovation and competitive advantage, but their primary focus has often been on large-scale industries in urban areas (Khan et al., 2021; Musonnafa et al., 2022; Xie et al., 2020; Zhang et al., 2020). For example, research from Nanath and Pillai (2017) has shown that green innovation can provide competitive benefits through cost reduction and enhanced corporate reputation on a large scale. Furthermore, previous research has focused on enhancing competitive advantage from an economic perspective, often neglecting competitive advantage from an environmental perspective. Additionally, existing studies

indicate that social capital can facilitate collaboration and access to information, but they do not specifically link this aspect to green innovation and competitive advantage in the context of coastal SMEs (Mankgele, 2023)

Therefore, this study seeks to fill this gap by exploring the synergy between green innovation and social capital in creating sustainable competitive advantage in coastal areas. The research will examine the role of social capital in driving green innovation and how its interaction can strengthen the economic competitiveness of coastal regions without compromising environmental sustainability. Thus, this study not only offers significant theoretical contributions but also provides practical insights that policymakers and stakeholders in coastal regions can use to design more holistic and sustainable development strategies.

Overall, this research aims to build a comprehensive conceptual model that integrates the dimensions of green innovation and social capital in the context of sustainable competitiveness in coastal regions. This model is expected to provide a solid foundation for further analysis and the implementation of development strategies that support environmental sustainability while enhancing the economic competitiveness of coastal areas. Through this approach, the study will not only enrich the literature on green innovation and social capital but also contribute to global efforts to achieve the Sustainable Development Goals (SDGs) in coastal regions.

LITERATURE REVIEW

Competitive Advantage

Competitive advantage is achieved when a firm identifies ways to position itself more effectively than its competitors in light of current and anticipated market conditions. It represents a core goal for all firms and, according to Hakkak and Ghodsi (2015), can only be attained through a commitment to sustainability. Innovation forms a crucial element of competitive advantage, contributing significantly to the prediction of customer satisfaction (Kawulur et al., 2025; Sumual et al., 2019). Furthermore, it was explained that competitive advantage involves: (1) the capacity to generate customer value, which enhances market potential; (2) the ability to scale operations through efficient processes and organizational structures; (3) long-term business sustainability via investments in leadership and innovation capabilities to strengthen performance and reduce risks; and (4) positive financial outcomes achieved by emphasizing value creation and minimizing complexity.

Beyond its role as a primary driver of superior performance and strong market standing, competitive advantage also influences various financial and non-financial indicators, including intellectual capital (Laksana et al., 2022). Environmentally friendly products, green design, and clean production processes can all serve as sources of competitive advantage (Arenhardt et al., 2016; Chuang et al., 2016). In addition, when communicated effectively, green product innovation helps firms comply with environmental regulations and can strengthen their market position by creating barriers for potential entrants. Successful green product development can reduce the likelihood of imitation and thereby reinforce competitive advantage (Chang, 2018). Through such innovation, firms can enhance design, quality, and reliability, differentiate their products, charge premium prices, and build long-term profitability by cultivating a favorable consumer image (Musonnafa et al., 2022).

Given the multifaceted benefits of green innovation for maintaining competitive advantage, managers are strongly encouraged to adopt green innovation strategies. Green products offer distinguishing attributes that enhance competitiveness and

influence product success at different stages of the supply chain. Eco-friendly retail products are increasingly in demand, particularly among environmentally conscious consumers and in markets with stricter environmental regulations (Chang, 2018). Nonetheless, competitive advantage remains a complex concept that involves risk; managers must weigh potential gains against the costs associated with innovation, differentiation, and operational improvement. A well-defined and carefully assessed competitive advantage derived from green product innovation can help firms more effectively pursue their strategic objectives.

Green Innovation

Innovation can be classified into several categories: creating and introducing new products (product innovation); adopting new production techniques (process innovation); entering or establishing new markets (marketing innovation); utilizing new production inputs, such as novel raw materials or newly developed semi manufactured goods (input innovation); and developing new organizational structures or even entirely new industries (organizational innovation).

In line with these categories, the European Commission (1995) describes innovation as the development of new or improved products and services, the expansion into new markets, the implementation of new production methods, including new approaches to sourcing and distribution, and managerial changes, which encompass organizational adjustments and modifications to working conditions.

All these definitions are fully relevant to the manufacturing sector. Gopalakrishnan and Damanpour (1997) observed that innovation is understood differently across academic disciplines. They grouped researchers into economists, technologists (both contextual and organizational), and sociologists (variance and process oriented), highlighting how each group conceptualizes innovation in distinct ways. The body of research on innovation has expanded steadily in recent years, likely due to evolving environmental conditions, organizational changes, and increasing emphasis on employee creativity.

The determinants of innovation within organizations were identified as six key components: information and communication, knowledge and skills, behavior and integration, idea generation and implementation, managerial guidance and support, and external environmental factors (Arenhardt et al., 2016; Chang, 2018; Kawulur et al., 2025; Musonnafa et al., 2022). In a literature review, researchers categorized the studies reviewed into three groups: those addressing innovation in general, those examining key stages of the innovation process, and those exploring innovation models (Beise & Rennings, 2005; Sumual et al., 2023). From this, they identified five generations of innovation models: technology-push, market-pull, coupling (a combination of push and pull), integrated, and functional integration models. Although they argued that the standard distinction between incremental and radical innovation is inadequate, proposing modular, architectural, and disruptive innovations as additional types.

Although innovation is widely recognized as a key driver of competitiveness and economic performance, it is equally important to consider innovations that promote environmental sustainability (Rennings, 1998). From this perspective, the concept of green innovation has become increasingly vital in the business world.

Scholars have described green or environmental innovation through several traits that differentiate it from traditional “brown” innovation. A frequently used definition frames it as the development of novel ideas, products, processes, or practices designed to prevent or lessen environmental damage or to meet specific ecological sustainability objectives (Beise & Rennings, 2005).

The key difference between green and non-green innovation lies in what [Rennings \(1998\)](#) calls the “double externality effect.” Beyond the usual technological spillovers generated by R&D activities, environmental innovation creates additional positive externalities by lowering environmental costs. Despite these greater overall external benefits, the factors that drive green and conventional innovation can still be largely the same.

The notion of environmental innovation encompasses a wide range of innovations, technical, economic, legal, institutional, organizational, and even behavioral, that help prevent or lessen environmental damage. Nevertheless, it is also essential to examine how specific factors influence a firm’s inclination to adopt more environmentally friendly production practices. In this context, [Corral \(2002\)](#) introduces a unique theoretical and methodological approach to identify the factors that motivate or discourage firms from implementing cleaner production, as well as the conditions under which pro-environmental innovation can be strengthened. Because this model seeks to explain a firm’s planned behavior within particular situations, it highlights three key categories of determinants: social norms, attitudes toward innovation, and the firm’s technological and organizational capabilities.

Social Capital

Social capital first emerged as a national-level concept rooted in informal norms. These norms were shaped by cooperation, religion, tradition, and shared historical experiences. Social capital functions as an important asset in both society and organizations. It is embedded in social relationships and networks. Scholars describe it through structural features such as network ties and stability. They also emphasize cognitive elements like shared goals and culture, as well as trust ([Leana & Van Buren III, 2013](#)). Social capital helps explain behavior, development, and challenges by revealing the resources and risks present in social relations. It also includes the resources people access through their relationships and their interpretations of those relationships. In practice, social capital plays a crucial role in event management by shaping interactions between organizations and participants ([Leana & Van Buren III, 2013](#)).

Hypotheses Development

Social Capital and Sustainable Competitive Advantage

This research uses the Resource-Based View (RBV) theory to explain the relationship between social capital, green innovation, and competitive advantage. The RBV theory considers that the company’s internal resources and capabilities are the main source of competitive advantage ([Başar, 2015](#)). The social capital owned by the company can become a valuable, rare, and difficult-to-imitate resource, which allows the company to achieve a competitive advantage ([Hanifah et al., 2020](#)). Social capital can enhance competitive advantage by facilitating collaboration and synergy among employees, partners, and other stakeholders in developing and sharing knowledge, resources, and capabilities aimed at creating competitive advantage ([Chuang et al., 2016](#)). Therefore, the hypothesis in this study is:

H1: Social capital has a positive effect on sustainable competitive advantage.

Social Capital and Green Innovation

The RBV sees the relationship between social capital and green innovation as a strategic resource that can be the foundation for companies to build a sustainable performance ([Chen et al., 2019](#)). Several studies have shown that social capital can facilitate the green innovation process ([Landry et al., 2002](#); [Mehmood & Hanaysha, 2022](#); [Suhaimee et al., 2020](#)). Companies with strong social capital can obtain various benefits, such as better

knowledge sharing, collaboration, and coordination, which can increase the capacity and process of green innovation (Liao, 2018). Additionally, social capital can also facilitate the transformation process of green innovation into environmentally friendly products or services, which can ultimately enhance the company's competitive advantage (Zhang et al., 2020). Based on this, the proposed hypothesis is:

H2: Social capital has a positive effect on green innovation.

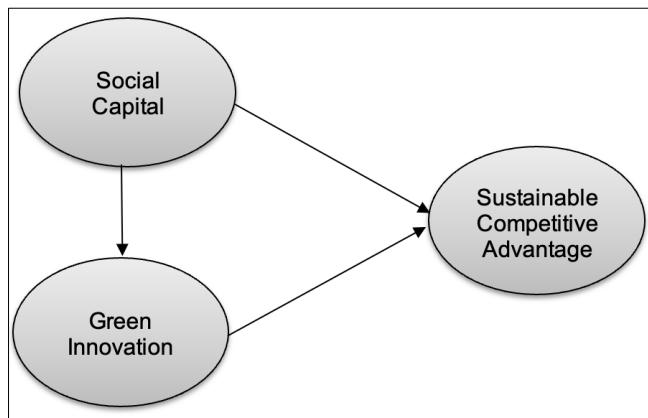
Green Innovation and Sustainable Competitive Advantage

The RBV sees the relationship between green innovation and competitive advantage as the company's efforts to develop and implement environmentally friendly technologies, products, services, and business processes, which can strengthen the company's competitive position (Peng, 2020; Tu & Wu, 2021). Previous research has shown that green innovation can be a source of competitive advantage for companies (Nasrollahi et al., 2020). Through green innovation, companies can develop more environmentally friendly products, processes, or services, which can improve the company's image, customer satisfaction, and market share, which can ultimately creating a competitive advantage (Tu & Wu, 2021). Therefore, the hypothesis of this research is:

H3: Green innovation has a positive effect on sustainable competitive advantage.

The conceptual framework of this study is illustrated in [Figure 1](#).

Figure 1. Research Framework



RESEARCH METHOD

To investigate the influence of social capital, green innovation, and sustainable competitive advantage, this study employed a survey of SMEs operating in coastal regions of North Sulawesi, Indonesia. North Sulawesi is a coastal area that has continuously promoted the concept of sustainable development and serves as one of Indonesia's pilot projects for achieving the SDGs. The SMEs examined in this study are fostered by Manado State University and have received mentoring in sustainable business management, enabling them to acquire basic knowledge of environmentally friendly business practices. The survey was conducted using online platforms such as email, WhatsApp, and social media, targeting business owners or managers. A total of 130 online questionnaires were distributed to managers and business owners; after screening for non-responses and missing values, 78 valid questionnaires were retained for further analysis. The sample size was determined using G Power analysis for Structural Equation Modelling (SEM). Based on these parameters, the G Power analysis indicated a minimum required sample size of 77 participants to achieve adequate statistical power.

The initial section of the questionnaire comprised a cover letter and a consent form, delineating the research objectives and the rationale for data collection. The consent form ensured the confidentiality and anonymity of participants and their affiliations, affirmed the voluntary nature of participation, and guaranteed participants' right to withdraw consent at any stage. Prior to engagement in the study, participants provided written consent voluntarily. Subsequently, the questionnaire proceeded to gather demographic information through five closed-ended questions. These inquiries addressed participants' socio-demographic characteristics, specifically their educational attainment, current occupational status, gender, age, and professional tenure.

The subsequent section of the questionnaire contains statements related to the variables under investigation, namely green innovation, social capital, and sustainable competitive advantage. The indicators of green innovation adopted from [Rustiarini et al. \(2022\)](#) consist of three dimensions specifically designed to explore green innovation within SMEs: (1) the use of environmentally friendly resources in products or services, (2) recycling practices, and (3) energy efficiency initiatives. The indicators of social capital were adapted from [Liu \(2021\)](#) and [Rustiarini et al \(2022\)](#), encompassing three dimensions: (1) mutual assistance and collaborative problem-solving, (2) information exchange and mutual learning among employees, and (3) mutual understanding and acceptance among colleagues. The indicators of sustainable competitive advantage were derived from [Liu \(2021\)](#), comprising three dimensions: (1) products or services that offer superior benefits compared to competitors, (2) products or services with higher quality than competitors, and (3) products or services that are more environmentally friendly than competitors. The questionnaire assessed respondents' perceptions using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The study employed Partial Least Squares-based Structural Equation Modeling (PLS-SEM) due to its predictive capability and suitability for analyses involving relatively small sample sizes.

RESULTS

Table 1. Demographic Characteristics of Respondents

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Male	45	57.7
	Female	33	42.3
Age	20-30 years	18	23.1
	31-40 years	32	41
	41-50 years	21	26.9
	> 50 years	7	9
Educational Attainment	High School	12	15.4
	Diploma (D3)	19	24.4
	Bachelor's Degree (S1)	38	48.7
	Master's Degree (S2)	9	11.5
Current Occupational Status	Owner	51	65.4
	Manager	27	34.6
Professional Tenure	< 3 years	14	17.9
	3-5 years	26	33.3
	6-10 years	24	30.8
	> 10 years	14	17.9
Total		78	100

[Table 1](#) presents the demographic profile of the 78 respondents who participated in this study. The sample comprised slightly more males (57.7%, n = 45) than females (42.3%, n = 33), reflecting the gender distribution commonly observed in SME ownership and

management in coastal regions of Indonesia. In terms of age distribution, the largest group of respondents was aged 31-40 years (41.0%, n = 32), followed by those aged 41-50 years (26.9%, n = 21), 20-30 years (23.1%, n = 18), and over 50 years (9.0%, n = 7). This age profile indicates that the majority of coastal SMEs in the sample are managed by individuals in their prime working years, suggesting substantial experience and maturity in business operations. Regarding educational attainment, nearly half of the respondents held bachelor's degrees (48.7%, n = 38), while 24.4% (n = 19) possessed diploma qualifications, 15.4% (n = 12) had completed high school education, and 11.5% (n = 9) held master's degrees. This educational profile demonstrates a relatively well-educated sample, with 84.6% having tertiary education qualifications, which may be attributed to the university-based mentoring program that fostered these SMEs.

The occupational status of respondents revealed that the majority were business owners (65.4%, n = 51), while 34.6% (n = 27) served as managers. This distribution ensures that responses were obtained from individuals with comprehensive knowledge of their organizations' strategic orientations, operational practices, and sustainability initiatives. Professional tenure in the business sector was relatively balanced across categories: 33.3% (n = 26) had 3-5 years of experience, 30.8% (n = 24) had 6-10 years, while both the less than 3 years and more than 10 years categories each represented 17.9% (n = 14) of the sample. This tenure distribution suggests a mix of emerging entrepreneurs and established business leaders, providing diverse perspectives on social capital development, green innovation adoption, and sustainable competitive advantage strategies. Overall, the demographic profile indicates a sample of educated, experienced, and strategically positioned respondents who are well-qualified to provide informed assessments of their organizations' social capital, green innovation practices, and competitive positioning in the context of sustainable development.

Table 2. Outer Model Measurement

Variable	Indicator	Loading Factor	Composite Reliability	AVE
Green Innovation	G1A	0.84	0.92	0.70
	G1B	0.78		
	G1C	0.89		
	G1D	0.94		
	G1E	0.71		
Social Capital	S2A	0.96	0.96	0.83
	S2B	0.94		
	S2C	0.77		
	S2D	0.92		
	S2E	0.94		
Sustainable Competitive Advantage	CA1A	0.90	0.957	0.76
	CA1B	0.89		
	CA1C	0.87		
	CA1D	0.87		
	CA1E	0.77		
	CA1F	0.90		
	CA1G	0.90		

The outer model evaluation was conducted to assess the reliability and validity of the measurement indicators for each construct. As shown in [Table 2](#), all factor loadings exceed the recommended threshold of 0.70 ([Hair et al., 2011](#)), indicating that the indicators adequately represent their respective latent constructs. The loading values for Green Innovation range from 0.71 to 0.94, Social Capital from 0.77 to 0.96, and Sustainable Competitive Advantage from 0.77 to 0.90, reflecting strong indicator reliability. In addition, composite reliability values for all constructs exceed 0.70,

confirming high internal consistency. Convergent validity, assessed through the Average Variance Extracted (AVE), is also supported, with values above the 0.50 threshold for Green Innovation (0.70), Social Capital (0.83), and Sustainable Competitive Advantage (0.76). Overall, these results demonstrate that the measurement model is both reliable and valid, providing a sound basis for subsequent structural model analysis.

Table 3. Hypothesis Testing

Variables		Sample Mean	Standard Deviation	T Statistics	P Values	Conclusion
1	Social capital -> Sustainable competitive advantage	0.597	0.079	7.530	0.000	Accepted
2	Social capital -> Green innovation	0.530	0.099	5.126	0.000	Accepted
3	Green innovation -> Sustainable competitive advantage	0.372	0.115	3.352	0.001	Accepted

The hypothesis testing results in [Table 3](#) indicate that all proposed relationships in the research model are statistically significant. Social capital has a positive effect on sustainable competitive advantage ($\beta = 0.597$; $t = 7.530$; $p < 0.001$), suggesting that trust, shared norms, and strong relational networks enhance firms' ability to sustain competitive advantages. Social capital also significantly influences green innovation ($\beta = 0.530$; $t = 5.126$; $p < 0.001$), indicating that collaborative relationships support the development of environmentally friendly products and processes. In addition, green innovation positively affects sustainable competitive advantage ($\beta = 0.372$; $t = 3.352$; $p = 0.001$), implying that eco-innovative practices contribute to strengthening firms' competitive positions. Overall, the significant paths confirm the robustness of the model and underscore the complementary roles of social capital and green innovation as strategic drivers of sustainable competitive advantage.

DISCUSSION

This study examined the relationships among social capital, green innovation, and sustainable competitive advantage in coastal SMEs of North Sulawesi, Indonesia. The empirical findings provide substantial support for all three hypothesized relationships, offering important theoretical and practical implications for sustainable business development in emerging market contexts.

The Effect of Social Capital on Sustainable Competitive Advantage (H1)

The first hypothesis, which posited that social capital positively influences sustainable competitive advantage, was strongly supported ($\beta = 0.597$, $t = 7.530$, $p < 0.001$). This finding represents the strongest relationship among all tested hypotheses, indicating that social capital serves as a critical strategic resource for coastal SMEs in building and maintaining sustainable competitive positions.

This result aligns with the theoretical foundations of the RBV and social capital theory ([Barney, 2000](#); [Nahapiet & Ghoshal, 1998](#)), which argue that intangible assets embedded in social relationships constitute valuable, rare, and difficult to imitate resources. Several mechanisms may explain this strong relationship. First, structural social capital manifested through network ties with suppliers, customers, government agencies, and other stakeholders provides coastal SMEs with access to critical

resources, including market information, sustainable technologies, and financial support. In the context of North Sulawesi's coastal communities, where SMEs often operate with limited resources and face environmental challenges, these network connections become essential survival mechanisms. Second, cognitive social capital, reflected in shared values and understanding regarding SDGs, creates collective commitment to environmentally responsible practices that differentiate these firms from competitors. Third, relational social capital, characterized by trust and reciprocity, reduces transaction costs and facilitates long-term collaborative relationships that enhance operational efficiency and customer loyalty.

This finding is consistent with previous empirical studies. [Acquaah \(2007\)](#) demonstrated that social capital enhances firm performance in developing economies through improved access to resources and information. Similarly, [Peng and Luo \(2000\)](#) found that network ties and relationships constitute crucial strategic assets in emerging markets where formal institutional support may be limited. More recently, [Agyapong et al. \(2017\)](#) and [Kamaluddin et al. \(2016\)](#) confirmed that social capital positively impacts competitive advantage in SMEs through enhanced innovation capabilities and market responsiveness. However, the magnitude of the effect observed in this study ($\beta = 0.597$) is notably higher than that reported in some previous studies. This may be attributed to the unique characteristics of coastal SMEs in North Sulawesi, where: (1) geographical isolation intensifies reliance on local networks for resource access; (2) community-based culture strengthens social ties and collective action; (3) environmental vulnerability necessitates collaborative approaches to sustainable resource management; and (4) institutional support from Manado State University's mentoring program reinforces the development and activation of social capital.

The Effect of Social Capital on Green Innovation (H2)

The second hypothesis, proposing a positive relationship between social capital and green innovation, was also supported ($\beta = 0.530$, $t = 5.126$, $p < 0.001$). This substantial effect demonstrates that social capital serves as a critical antecedent to green innovation capabilities in coastal SMEs, enabling them to develop and implement environmentally friendly products, processes, and management systems.

This finding corroborates the theoretical proposition that social capital facilitates knowledge creation and innovation through three primary mechanisms ([Nahapiet & Ghoshal, 1998](#)): combination, exchange, and access to resources. In the context of green innovation, these mechanisms are particularly relevant. First, structural social capital provides SMEs with access to diverse knowledge sources, including universities (Manado State University), government environmental agencies, green technology providers, and environmentally conscious customers that expose firms to new ideas and best practices in sustainable business. Second, relational social capital, built on trust and mutual obligation, reduces the risk and cost of knowledge sharing, encouraging collaborative innovation efforts such as joint development of eco-friendly fishing practices or sustainable tourism offerings. Third, cognitive social capital creates a shared understanding of environmental challenges and SDG priorities, aligning stakeholders around common goals and facilitating collective problem-solving.

The empirical evidence supports existing literature on the social capital innovation nexus. [Landry et al. \(2002\)](#) found that social capital enhances innovation through improved information flows and collaborative opportunities. [Cai et al. \(2019\)](#) specifically demonstrated that social capital dimensions positively influence green innovation in Chinese manufacturing SMEs by facilitating environmental knowledge acquisition and utilization. Similarly, [De Clercq and Dimov \(2008\)](#) showed that network relationships provide SMEs with critical resources and legitimacy needed for innovative activities.

Fakhreddin et al. (2025) suggest that green innovation arises not merely from resources but also from the ability to integrate external knowledge flows within trust-based networks.

The coastal SME context of North Sulawesi provides particularly fertile ground for this relationship. These firms operate in environments characterized by rich biodiversity, tourism potential, and marine resources that offer unique opportunities for green innovation (e.g., eco tourism services, sustainable seafood products, marine-based wellness offerings, biodegradable packaging from marine materials). However, developing such innovations requires knowledge and resources typically unavailable within individual small firms. Social capital bridges this gap by connecting SMEs to external knowledge repositories and innovation partners.

Moreover, the mentoring program provided by Manado State University serves as an institutional mechanism for building social capital specifically oriented toward sustainability. This program creates formal network structures that connect SMEs with academic expertise, government sustainability initiatives, and fellow green entrepreneurs, thereby catalyzing green innovation activities. The cognitive dimension is reinforced through shared training on SDGs and environmental management, creating a common language and commitment to sustainability.

The Effect of Green Innovation on Sustainable Competitive Advantage (H3)

The third hypothesis, which proposed that green innovation positively influences sustainable competitive advantage, received empirical support ($\beta = 0.372$, $t = 3.352$, $p = 0.001$). While this relationship is statistically significant and theoretically meaningful, the effect size is notably smaller than those of the social capital relationships (H1 and H2), suggesting that the pathway from green innovation to sustainable competitive advantage is more complex.

This finding aligns with the RBV (Barney, 2000), which argues that environmental capabilities, including pollution prevention, product stewardship, and sustainable development, constitute sources of competitive advantage in an increasingly environmentally conscious marketplace. Green innovation, as a manifestation of these capabilities, enables coastal SMEs to achieve sustainable competitive advantage through multiple value creation mechanisms. Furthermore, the significant link between social capital and green innovation underscores the catalytic role of interorganizational relationships in promoting environmental innovation. Firms embedded in strong social networks gain privileged access to diverse knowledge, technological insights, and sustainability-driven practices, thereby fostering innovation that minimizes ecological footprints and enhances strategic adaptability (Murphy et al., 2016).

Green innovation contributes to competitive advantage through multiple, interrelated mechanisms. It enables differentiation by creating distinctive value propositions, such as eco-certified seafood products, zero-waste tourism experiences, and biodegradable packaging, that appeal to environmentally conscious consumers, including both domestic and international tourists visiting North Sulawesi, thereby supporting premium pricing and customer loyalty. At the same time, process-oriented green innovations, including energy-efficient operations, waste-reduction systems, and circular resource utilization, enhance cost efficiency by lowering operational expenses while reducing environmental impact, generating simultaneous economic and environmental value. Beyond economic benefits, green innovation signals a strong commitment to sustainability, strengthening corporate reputation and legitimacy among key stakeholders such as government regulators, non-governmental organizations, local communities, and international buyers who increasingly demand environmental

compliance. Moreover, as environmental regulations become more stringent at both global and local levels, firms with strong green innovation capabilities are better positioned to anticipate regulatory changes, mitigate compliance risks, and avoid penalties or operational disruptions.

The empirical evidence supports previous research findings. [Chen et al. \(2006\)](#) demonstrated that green innovation positively impacts competitive advantage through enhanced corporate image and customer satisfaction. [Chiou et al. \(2011\)](#) found that green innovation mediates the relationship between environmental management and firm performance. More recently, [Albert-Morant et al. \(2016\)](#) confirmed that green innovation capabilities contribute to competitive advantage in SMEs through both differentiation and cost leadership strategies.

CONCLUSION

This study examined the relationships among social capital, green innovation, and sustainable competitive advantage using PLS-SEM. The empirical findings demonstrate that social capital plays a central role in enhancing sustainable competitive advantage both directly and indirectly by supporting green innovation activities. In addition, green innovation exerts a significant, though comparatively weaker, positive effect on sustainable competitive advantage, indicating that eco-innovative practices function as an important complementary mechanism rather than a standalone driver of competitive positioning. Collectively, these results highlight the strategic importance of relational resources and environmentally oriented innovation in fostering long-term competitiveness among coastal SMEs.

From a theoretical perspective, this research contributes to the literature by extending the RBV through a relational and sustainability-oriented lens. The findings empirically confirm that social capital constitutes a valuable and inimitable strategic resource that enables firms to access knowledge, reduce transaction costs, and mobilize collaborative efforts toward green innovation. While not directly operationalized as a dynamic capability, green innovation reflects firms' capacity to reconfigure relational and environmental resources in response to sustainability pressures, thereby reinforcing competitive advantage in emerging economy contexts.

From a managerial and policy standpoint, the findings underscore the need for firms to prioritize the development of social capital alongside investments in green innovation. Managers are encouraged to cultivate long-term, trust-based relationships with key stakeholders, including suppliers, customers, academic institutions, and government agencies, to facilitate knowledge exchange and collaborative sustainability initiatives. Embedding environmental considerations into innovation strategies can further enhance differentiation, operational efficiency, and legitimacy. For policymakers, particularly in coastal regions, the results suggest the importance of institutional frameworks and incentive schemes that support collaborative green innovation and strengthen interorganizational networks. Such initiatives can enhance firm resilience while accelerating the transition toward more sustainable and competitive local economies.

LIMITATION

Despite these significant contributions, this study is subject to several limitations. First, the data were collected primarily within the context of coastal areas; consequently, the generalizability of the findings to developed markets or differing institutional environments may be limited. Second, the study employs a cross-sectional design. While the SEM analysis reveals robust associations, it restricts the ability to observe the causal evolution of these variables over time or to fully capture the long term dynamics of

sustainable competitive advantage. Finally, the reliance on self-reported survey data introduces the possibility of common method bias, although statistical remedies were applied to mitigate this concern.

These limitations open meaningful avenues for future inquiry. Future research could extend this model by incorporating moderating factors such as institutional support, environmental uncertainty, or digital transformation that may further shape the relationships between social capital, innovation capabilities, and sustainability performance. Additionally, longitudinal studies and cross-area comparative analyses are recommended to provide deeper insights into the dynamic evolution of these constructs, thereby addressing the temporal constraints inherent in the current study.

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DECLARATION OF CONFLICTING INTERESTS

The authors declare that there are no conflicts of interest.

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