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Resource Constraints and Sustainable Diversification in SMEs: Social Capital Mechanisms and Sustainable Development Outcomes

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Abstract

Resource-constrained small and medium-sized enterprises (SMEs) are increasingly expected to participate in green industry development and contribute to sustainable development. However, these SMEs are reported to be lacking in financial, technological, informational and human resources to transform green opportunities into diversification options. The current studies offer limited explanation of how multidimensional social capital can help SMEs transform external network resources into diversification capabilities for sustainable development. Building on resource-based view, social capital theory and sustainable development literature, this conceptual paper aims to develop a testable framework that links relational, structural and cognitive social capital with SME sustainable diversification into green industries. The framework explains how relational capital helps transform external resources into trust-based resource sharing, structural capital broadens SMEs' access to institutional and non-redundant resource networks, and cognitive capital enables SMEs to meet sustainability standards and stakeholders' expectations. It further specifies absorptive capacity as a conversion mechanism and institutional context as a boundary condition shaping whether SMEs can transform social capital into sustainable diversification outcomes. It also explains the dark side of social capital, including network lock-in, over-embeddedness, groupthink and exclusionary ties that may lead to social capital failure. By linking firm-level social capital mechanisms with economic, environmental and social outcomes towards Sustainable Development Goals, the study advances a more development-oriented explanation of SME green transition and makes implications for SME managers, policymakers and institutional actors.

Keywords

Resource constraints, Sustainable diversification, SMEs, Social capital, Green industries, Sustainable development goals, Absorptive capacity

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1. Introduction

1.1 Research Background

There is an increasing expectation that small and medium-sized enterprises (SMEs) will participate in the global transition to a low-carbon and sustainable development [1]. This expectation is particularly prominent in green industries, such as renewable energy, eco-manufacturing, sustainable agriculture, green logistics, and circular economy services [2]. These new industries offer SMEs new opportunities to produce green products, enter new markets, and decrease their reliance on business activities based on resource consumption. This expectation creates a dilemma, however: SMEs are expected to participate in sustainability transitions, but they lack the means to do so.

Resource constraints are not only barriers to firm growth [3]; they can also limit SMEs' ability to respond to sustainability-related expectations and stakeholder demands [4]. SMEs are often found to be lacking in financial capital, technology, market information and human resources for sustainability-related changes. This hinders SMEs' emissions reduction, circular loop development, green certificate achievement, green employment development, and low-carbon value chain participation behaviors, which collectively constrains the economic, environmental, and social sustainability performance of these SMEs.

Sustainable diversification offers one possible pathway through which SMEs can respond to this dilemma [5]. In this study, sustainable diversification refers to the expansion of SME products, services, markets, or value-chain activities into green industries in ways that combine commercial viability with environmental and social value creation [6]. Unlike conventional diversification, which mainly emphasizes market expansion, risk reduction, or profitability, sustainable diversification requires SMEs to align new business activities with environmental standards, stakeholder expectations, and broader development goals.

Since SMEs cannot depend solely on their own resources, social capital may play a potentially critical role in SME sustainable diversification [7]. SMEs can obtain green finance, technological knowledge, market information, institutional resources, and cooperative partners through relationships, networks, shared norms, and mutual trust. However, social capital cannot ensure the success of SME green diversification. Social capital can only play a positive role when SMEs can transform network external resources into usable capabilities, when institutional environment promotes green diversification and when networks are open rather than closed, redundant or exclusionary. Therefore, this study explores enabling and conditional effects of social capital in SME sustainable diversification.

1.2 Research Gap, Objectives, and Questions

Despite the limited exploration of SME sustainability, social capital, and green transition in previous studies, four gaps still exist. First, previous studies generally focus on general sustainability practices or environmental performance, and rarely consider sustainable diversification as one of the pathways through which SMEs enter green industries. Second, most literature regards social capital as positive resources, but offers limited explanations to the following questions: why SMEs with social capital still cannot achieve green diversification, even though they have networks, relationships based on trust, and similar sustainability values? Third, resource constraints are generally described as firm-level factors, and the connection between resource constraints and SMEs' broader sustainability dilemma is underdeveloped. Fourth, few studies link SME-level social capital mechanisms to SDG-related economic, environmental and social outcomes.

To bridge these gaps, this study aims to construct a conceptual model that elucidates how SMEs overcome SME resource constraints by leveraging relational, structural, and cognitive social capital [8] to pursue sustainable diversification into green industries. Specifically, this study clarifies sustainable diversification and explains the sustainable development dilemma caused by SME resource constraints. This study also identifies the mechanisms by which social capital facilitates resource access, knowledge transfer, stakeholder alignment, and legitimacy building, develops testable propositions, and bridges SME-level diversification mechanisms and SDG-related outcomes.

Accordingly, this study addresses the following research questions:

RQ1. How do relational, structural, and cognitive social capital help SMEs overcome resource constraints during sustainable diversification into green industries?

RQ2. Through what mechanisms does social capital contribute to sustainable diversification, and how does absorptive capacity convert external network resources into usable green capabilities?

RQ3. How do institutional context, sectoral conditions, and the dark side of social capital shape the effectiveness of social capital in SME green diversification?

RQ4. How can SME-level sustainable diversification contribute to broader sustainable development outcomes and SDG alignment?

1.3 Research Contributions

The study makes the following four main contributions. First, it extends SME sustainability research beyond general

environmental practice to sustainable diversification as a means to enter green industries. Second, it examines how resource-constrained SMEs broaden their diversification horizons to enter green industries with commercial viability and sustainable development goals in mind.

Third, it contributes to social capital theory by showing how relational, structural, and cognitive capital can be leveraged to convert SME social relationships into green diversification capabilities through resource sharing, network access, stakeholder alignment, and legitimacy attainment. Fourth, the study contributes to sustainable development research by linking firm-level diversification mechanisms with broader development outcomes, including economic resilience, green employment, responsible production, resource efficiency, emission reduction, and multi-stakeholder partnerships. These outcomes are aligned with SDG 8, SDG 9, SDG 12, SDG 13, and SDG 17. Given the European institutional context reflected in our literature and policy references, the framework's applicability to other regions—particularly emerging economies with weaker green policy frameworks—requires further empirical investigation, which we address in the limitations section.

2. Literature Review

2.1 Resource Constraints and the Sustainable Development Dilemma of SMEs

Resource constraints are a persistent challenge for SMEs and may limit their capacity to adopt environmental practices and pursue sustainable transitions [9]. For the purpose of this study, resource constraints are defined as the scarcity of critical resources—financial, human, technological, and informational—that are necessary for SMEs to pursue strategic objectives, such as diversification into new sectors. In green industries, these constraints also create a sustainable development dilemma because SMEs are expected to support low-carbon transition while lacking the resources needed to do so effectively. Financial constraints are particularly acute for SMEs, as they face difficulties accessing traditional financing (e.g., bank loans) due to limited collateral, lack of credit history, and higher perceived risk by lenders. In the context of green industries, financial constraints are further exacerbated by the high upfront costs of green technologies (e.g., renewable energy equipment, eco-friendly production processes) and the long payback periods associated with green investments, which may delay environmental upgrading and limit SMEs' contribution to responsible production and climate-related transition [10].

Technological constraints also hinder SME entry into green industries. SMEs often lack the specialized technical expertise required to develop or adopt green technologies, such as carbon capture systems, cleaner production processes, environmental monitoring tools, or circular economy processes. External knowledge and collaborative innovation can help firms develop capabilities that are difficult to build internally, although using these resources effectively requires appropriate organizational capabilities [11]. Informational constraints, including limited knowledge of green market trends, consumer preferences, and regulatory requirements (e.g., carbon emission standards, green certification processes), further impede SME ability to navigate green industry entry and may prevent them from identifying viable green opportunities or meeting stakeholder expectations.

Human resource constraints, including shortages of workers with relevant green skills and technical expertise [12], also contribute to the challenges SMEs face in green diversification. These skills gaps may reduce SMEs' absorptive capacity, or their ability to recognize, assimilate, and apply external green knowledge obtained through networks. Collectively, these resource constraints create a significant barrier for SMEs seeking to capitalize on the opportunities offered by green industries, highlighting the need for alternative strategic resources—such as social capital—to bridge these gaps. They also show why SME green diversification should be understood not only as a firm-level growth strategy, but also as a pathway linked to economic, environmental, and social dimensions of sustainable development [13].

2.2 Sustainable Diversification in SMEs

Diversification strategy has long been a central theme in strategic management, with the Ansoff Matrix providing a foundational framework for understanding how firms expand into new products or markets [5]. Sustainable diversification extends this concept by emphasizing the integration of environmental, social, and governance (ESG) objectives into diversification efforts. For SMEs, sustainable diversification into green industries involves expanding business activities into sectors that prioritize environmental sustainability, such as renewable energy, eco-friendly manufacturing, sustainable agriculture, green logistics, and circular economy services. In this study, sustainable diversification is defined as the expansion of SME products, services, markets, or value-chain activities into green industries in ways that combine commercial viability with environmental and social value creation.

Sustainable diversification offers SMEs multiple benefits, including reduced dependence on resource-intensive sectors, enhanced brand reputation among environmentally conscious consumers, and access to new revenue streams from growing green markets. However, unlike conventional diversification, which mainly emphasizes market expansion, risk reduction, and financial performance, sustainable diversification into green industries requires SMEs to align their operations with strict environmental standards, social expectations, green certification requirements, and long-term sustainability goals. It may take the form of related diversification, where SMEs extend existing capabilities into adjacent green markets, or unrelated diversification, where they enter green sectors that require substantially new knowledge and

capabilities. These requirements intensify the resource constraints SMEs face. Existing research on SME sustainable diversification has focused primarily on the drivers and barriers of such strategies, with limited attention to the role of social capital as an enabler of green diversification amid resource scarcity. In addition, less attention has been paid to how sustainable diversification can be assessed through environmental improvement, social value creation, and broader sustainable development outcomes rather than firm growth alone.

2.3 Social Capital Theory: Dimensions and Relevance for SMEs

Social capital theory, first formalized by Bourdieu and later expanded by Putnam and Nahapiet and Ghoshal, conceptualizes social capital as a valuable intangible resource embedded within social networks. Nahapiet and Ghoshal proposed a three-dimensional framework of social capital that has become the dominant paradigm in management research: relational, structural, and cognitive capital. For SMEs pursuing sustainable diversification, these three dimensions are important because they shape how firms access external resources, interpret sustainability-related knowledge, and build legitimacy in green industries.

Relational capital refers to the quality of relationships between actors in a network, characterized by trust, mutual respect, reciprocity, and mutual understanding. For SMEs, relational capital is built through long-term interactions with stakeholders, such as suppliers, customers, and industry peers. Trust, a core component of relational capital, reduces transaction costs by minimizing opportunistic behavior and facilitating collaborative problem-solving [14]. In the context of green transition, relational capital can enable SMEs to access resources through informal partnerships and knowledge-sharing agreements with stakeholders who possess green expertise or resources. This is particularly important because green diversification often involves uncertainty, shared investment risks, and long payback periods, all of which require trusted relationships among partners.

Structural capital focuses on the formal and informal network ties that connect actors, as well as the institutional arrangements that facilitate network access. This dimension includes the density of network connections, the presence of bridging ties (connecting diverse groups) and bonding ties (strengthening within-group cohesion) [15], and access to institutional actors such as governments, industry associations, and research institutions. For SMEs, structural capital expands their resource pool by providing access to institutional support (e.g., green policy incentives) and industry networks that can share green technologies and market information. In green industries, structural capital is especially relevant because SMEs often need access to certification bodies, public support programs, research institutions, lead firms, and cross-sector partners.

Cognitive capital encompasses the shared values, norms, beliefs, and goals that enable actors in a network to communicate effectively and collaborate towards common objectives [8,16]. In the context of green industries, cognitive capital involves shared sustainability values and a common understanding of environmental goals (e.g., carbon neutrality, circular economy principles). Cognitive capital reduces communication barriers and aligns SME strategies with stakeholder expectations, making it easier for SMEs to integrate into green industry networks and access relevant resources. It also helps SMEs distinguish substantive sustainability practices from symbolic or superficial green claims, which is important for legitimacy in green markets.

For SMEs, social capital is particularly valuable because it enables them to overcome the “liability of smallness” by leveraging external resources [17]. Unlike tangible resources (e.g., financial capital), social capital is built through ongoing interactions and can be accessed with relatively low upfront costs, making it an accessible strategic resource for resource-constrained SMEs. However, social capital should not be treated as automatically beneficial. Dense ties, closed networks, or highly homogeneous relationships may also create network lock-in, reduce exposure to new knowledge, and limit access to unfamiliar green opportunities. This dual role of social capital needs to be considered when explaining SME sustainable diversification.

2.4 The Intersection of Social Capital and SME Green Transition

Emerging research has begun to explore the role of social capital in supporting SME sustainability and green transition, but most studies have focused on general environmental performance rather than specific green diversification strategies. Existing studies suggest that supplier and customer relationships can support the adoption of green supply chain practices [18], while broader network ties may help SMEs access circular economy knowledge and technologies. However, these studies do not explicitly examine how the three dimensions of social capital collectively facilitate sustainable diversification into green industries, nor do they address the specific mechanisms through which social capital overcomes resource constraints in this context. Although existing studies have examined circular economy concepts and the role of eco-innovation, further research is needed to explain how SMEs convert social capital into practical capabilities for green diversification, including technological upgrading, certification readiness, and market entry [19,20].

A small number of studies have focused on social capital and green diversification, but they often overlook the multi-dimensional nature of social capital. Much of this work focuses on collaborative relationships or partnerships external to the firm [21], whereas the joint effects of relational, structural and cognitive capital have received less attention. Consequently, the existing body of research cannot account for the fact that some SMEs with rich relationships or dense networks still experience green diversification failure. Importantly, social capital may facilitate green transition only when

networks provide non-redundant resources, when SMEs have absorptive capacity to benefit from external knowledge, and when institutional conditions mitigate the entry risks into a green industry. Research on collaborative circular innovation highlights the importance of external relationships and knowledge sharing [22]. Building on this perspective, the present study examines how the three dimensions of social capital contribute to SME sustainable diversification and how their effects may vary across organizational and institutional conditions.

2.5 Boundary Conditions and Conversion Mechanisms: Institutional Context and Absorptive Capacity

The effectiveness of social capital in facilitating SME green diversification is likely influenced by contextual and organizational factors. The institutional context—including government policies, regulatory frameworks, and industry norms—plays a critical role in shaping the value of social capital for SMEs [23]. For example, supportive green policies, such as tax incentives for green investments, green certification programs, green finance schemes, and public procurement support, can enhance the benefits of social capital by providing institutional legitimacy to SME green diversification efforts and facilitating access to policy-related resources. Conversely, a lack of supportive policies may limit the effectiveness of social capital by increasing the risks and costs of green industry entry. Thus, institutional context functions as a boundary condition that determines whether social capital can be translated into viable and legitimate green diversification outcomes.

Organizational absorptive capacity—the ability of a firm to identify, assimilate, and apply external knowledge—is another key factor [24] shaping the effectiveness of social capital. Rather than serving only as a moderator, absorptive capacity also operates as a conversion mechanism through which SMEs transform external network resources into internal green capabilities. For SMEs to leverage social capital effectively, they must possess the absorptive capacity to recognize the value of green resources and knowledge obtained through social networks, integrate this knowledge into their operations, and apply it to sustainable diversification efforts. SMEs with high absorptive capacity are better able to convert social capital into tangible outcomes, such as successful entry into green markets, while those with low absorptive capacity may struggle to benefit from social network resources. This distinction is important because access to social capital alone does not guarantee sustainable diversification; SMEs must also be able to absorb and apply the resources gained through their networks.

2.6 Research Gaps

The literature review reveals four gaps. First, previous studies have not yet explained how relational, structural, and cognitive social capital integrate in the process of SME sustainable diversification. Second, the process by which social capital is transformed into green capabilities is weakly developed. Third, the boundary conditions of the relationship between social capital and green capabilities, such as institutional context, absorptive capacity, sectoral differences, and the dark side of social capital, remain unclear. Fourth, scant attention has been devoted to exploring how SME-level sustainable diversification leads to the economic, environmental, and social SDG outcomes. This study attempts to bridge these gaps by constructing a conditional conceptual framework.

3. Theoretical Framework and Mechanisms

3.1 Conceptualizing the Relationship Between Social Capital and Sustainable Diversification

Building on the resource-based view and social capital theory, this study proposes that relational, structural, and cognitive dimensions of social capital jointly enable SMEs to overcome resource constraints and pursue sustainable diversification into green industries. From a resource-based perspective, firms achieve competitive advantage by leveraging valuable, rare, inimitable, and non-substitutable (VRIN) resources [25]. Social capital, as an embedded and network-based intangible resource, exhibits these characteristics by facilitating access to heterogeneous external resources that are otherwise difficult to obtain for resource-constrained SMEs. However, the value of social capital is not automatic. It must be converted into actionable capabilities through knowledge absorption and transformation processes.

Accordingly, this study adopts a capability conversion perspective to explain how social capital translates into sustainable diversification outcomes. Resource constraints generate the initial impetus for SMEs to seek external resources. Social capital enables access to such resources, while absorptive capacity serves as a key mediating mechanism that allows firms to acquire, assimilate, transform, and exploit external knowledge for green innovation and market expansion. Moreover, institutional context, sectoral heterogeneity, and the dark side of social capital introduce important boundary conditions that shape the effectiveness of this conversion process. In particular, overly embedded or redundant networks may generate lock-in effects and reduce strategic flexibility.

To make the central pathway explicit, the framework specifies how the three constructs interact. Social capital operates as the distal antecedent that supplies raw external resources (finance, technology, information, legitimacy); absorptive capacity operates as the proximal conversion engine that turns those resources into internal green capabilities; and sustainable diversification is the outcome. The strongest causal leverage is expected at the conversion stage: because resource-constrained SMEs can usually access some external resources through ties, the binding constraint is typically not network access but the firm's ability to recognize, assimilate, transform, and exploit that knowledge. Consequently,

two SMEs with comparable social capital may diverge sharply in diversification outcomes purely because of differences in absorptive capacity. The propositions therefore treat social capital as necessary-but-insufficient and absorptive capacity as the mechanism that decides whether network potential is realized.

Figure 1 presents the integrated theoretical framework of SME sustainable diversification, incorporating resource constraints, multidimensional social capital, absorptive capacity, and SDG-aligned development outcomes, together with key mediating and moderating mechanisms.

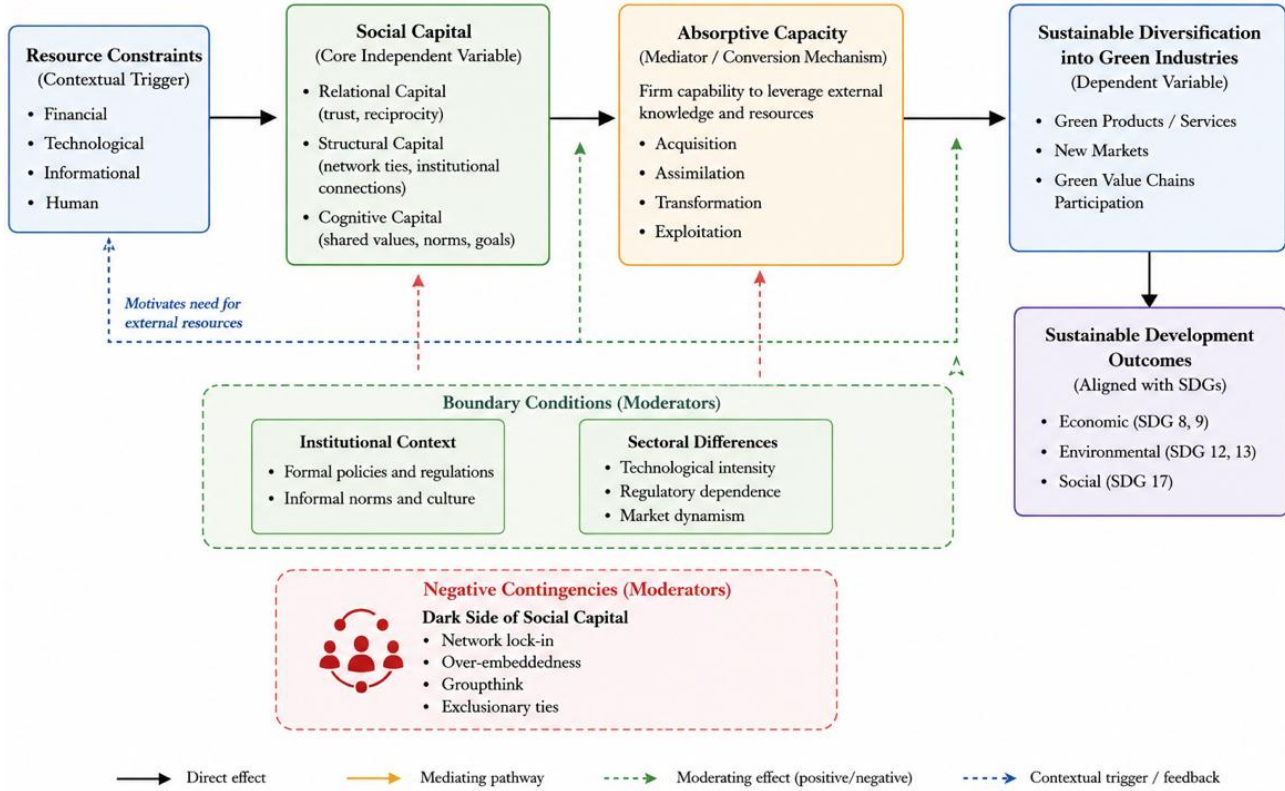


Figure 1. Integrated theoretical framework of SME sustainable diversification: The roles of social capital, absorptive capacity, and boundary conditions.

Note: Figure 1 illustrates the principal relationships among resource constraints, multidimensional social capital, absorptive capacity, sustainable diversification, and sustainable development outcomes. Absorptive capacity is presented as a knowledge-conversion mechanism, while institutional context, sectoral differences, and the dark side of social capital represent key boundary conditions. The arrows indicate the proposed relationships and contextual influences within the conceptual framework.

Specifically, institutional context moderates the strength and, under volatile or unsupportive conditions, the direction of the three social-capital-to-diversification paths (relational, structural, and cognitive) and of the absorptive-capacity conversion stage. Sectoral differences moderate the relative weight of the three social-capital dimensions on sustainable diversification, such that structural capital matters more in technology-intensive and regulation-dependent sectors while relational and cognitive capital matter more in stakeholder-sensitive sectors. The dark side of social capital (network lock-in, over-embeddedness, groupthink, and exclusionary closure) moderates the three social-capital-to-diversification paths in a negative direction, weakening the favorable effect. In Figure 1, absorptive capacity is presented primarily as the mechanism through which external knowledge and resources contribute to sustainable diversification. Section 4.2 further discusses how pre-existing absorptive capacity may condition the effectiveness of social capital. This additional theoretical distinction is addressed in Proposition 6b but is not separately illustrated in Figure 1.

3.2 Mechanisms of Relational Capital in Overcoming Resource Constraints

Relational capital, rooted in trust and reciprocity, enables SMEs to overcome resource constraints through three key mechanisms: collaborative resource sharing, informal financing, and knowledge transfer. In green diversification, relational capital is especially important because SMEs often need partners who are willing to share risks, provide credible information, and support long-term sustainability-oriented investments.

First, collaborative resource sharing with trusted stakeholders allows SMEs to access green resources without incurring the full cost of ownership. For example, SMEs can form collaborative partnerships with suppliers to share the cost of green raw materials or with larger firms to access green production facilities. Trust reduces the risk of opportunistic behavior in these partnerships, making it easier for SMEs to negotiate resource-sharing agreements. In the context of eco-friendly manufacturing, for instance, a small textile firm might partner with a larger apparel company to access eco-friendly dyeing equipment, overcoming technological and financial constraints. Such collaboration can also reduce the

uncertainty of sustainable diversification by allowing SMEs to experiment with green production before making large irreversible investments.

Second, relational capital facilitates access to informal financing for green investments. SMEs often struggle to access formal green finance due to limited collateral and credit history, but trusted relationships with investors, customers, or suppliers can provide alternative financing sources (e.g., trade credit, equity investments, or crowdfunding support). For example, a sustainable agriculture SME might secure advance payments from a trusted restaurant chain to fund the adoption of organic farming practices, overcoming financial constraints. In this way, relational capital can partially compensate for weak formal financing channels and help SMEs initiate green activities that would otherwise be delayed or abandoned.

Third, relational capital enables knowledge transfer of green expertise and market information. Trusted relationships with industry peers, research institutions, or consultants allow SMEs to access specialized knowledge about green technologies, regulatory requirements, and consumer preferences. For example, a small renewable energy service firm might gain knowledge about solar panel installation best practices through a trusted relationship with a larger energy company, overcoming technological and informational constraints. However, the value of such knowledge transfer depends on whether the relationship provides relevant and non-redundant knowledge rather than merely reinforcing familiar practices.

Proposition 1a. Relational capital is positively associated with SMEs' access to trust-based resource sharing, informal financing, and green knowledge transfer during sustainable diversification.

Proposition 1b. The positive relationship between relational capital and sustainable diversification is stronger when trusted relationships provide non-redundant, sustainability-relevant resources (e.g., specialized green knowledge, co-investment opportunities) rather than purely affective or redundant ties.

3.3 Mechanisms of Structural Capital in Overcoming Resource Constraints

Structural capital, characterized by network ties and institutional connections, enables SMEs to overcome resource constraints through three key mechanisms: institutional support access, industry network integration, and bridging to diverse resource pools. Compared with relational capital, which emphasizes relationship quality, structural capital focuses on the position, reach, and diversity of SMEs' networks. These features are important because sustainable diversification often requires access to resources beyond SMEs' existing local or familiar ties.

First, structural capital provides SMEs with access to institutional support for green diversification. Connections to government agencies, industry associations, and non-governmental organizations (NGOs) enable SMEs to access green policy incentives, such as tax breaks, grants, or subsidies for green investments. For example, an SME in green logistics might leverage its membership in a national logistics association to access government funding for electric vehicle fleets, overcoming financial constraints. Such institutional connections can also improve the legitimacy of SME green diversification by helping firms understand regulatory expectations and comply with environmental standards.

Second, structural capital facilitates integration into green industry networks, which provide access to collective resources and market channels. Industry networks—such as green business clusters or sustainability consortia—enable SMEs to share green technologies, collaborate on marketing efforts, and access collective purchasing power. For instance, a small eco-friendly packaging firm might join a circular economy business cluster to access new customers and share knowledge about recyclable materials, overcoming informational and market access constraints. These networks can reduce the isolation of resource-constrained SMEs and help them participate in wider green value chains.

Third, structural capital's bridging ties connect SMEs to diverse resource pools that would otherwise be inaccessible. Bridging ties—links to actors outside the SME's immediate network—provide access to new technologies, markets, and expertise. For example, an SME in sustainable agriculture might use bridging ties to connect with international organic certification bodies, gaining access to global markets for organic products and overcoming market information constraints. The value of structural capital therefore depends not only on the number of network ties, but also on whether these ties provide diverse and non-redundant resources for green diversification.

Proposition 2a. Structural capital—particularly ties to government agencies, industry associations, and cross-sector partners—positively influences SMEs' access to institutional support, green industry networks, and diverse external resources during sustainable diversification.

Proposition 2b. Bridging ties strengthen the relationship between structural capital and SME sustainable diversification because they provide access to non-redundant resources, new knowledge, and unfamiliar green market opportunities.

3.4 Mechanisms of Cognitive Capital in Overcoming Resource Constraints

Cognitive capital, based on shared sustainability values and goals, language, and interpretive frameworks, enables SMEs to overcome resource constraints through three key mechanisms: aligned strategy development, stakeholder engagement, and legitimacy building. In green diversification, cognitive capital is important because SMEs must not only access resources, but also understand what counts as credible, compliant, and value-creating sustainability practice.

First, shared sustainability values facilitate aligned strategy development, ensuring that SME diversification efforts are

focused on green industry opportunities that are consistent with stakeholder expectations. This alignment reduces the risk of misinvesting limited resources in green initiatives that do not meet market or regulatory requirements. For example, an SME in eco-friendly manufacturing might leverage shared values with customers to develop products that meet specific sustainability standards (e.g., carbon neutrality), ensuring that resource investments in product development are targeted and effective. Thus, cognitive capital helps SMEs allocate scarce resources to green opportunities that are both commercially viable and environmentally credible.

Second, cognitive capital enhances stakeholder engagement by creating a common language and understanding of sustainability goals. This engagement enables SMEs to secure stakeholder support—including financial backing, technical assistance, and market access—for green diversification efforts. For instance, an SME in renewable energy services might engage with local communities and policymakers around shared carbon reduction goals, gaining support for the deployment of renewable energy projects and overcoming institutional and market access constraints. Such shared understanding reduces communication barriers and helps SMEs coordinate with stakeholders whose expectations may differ across markets, regulatory systems, and sustainability standards.

Third, cognitive capital builds institutional legitimacy for SME green diversification efforts. Legitimacy—defined as the acceptance of an organization's activities by society—is critical for SMEs entering green industries, as it enhances their ability to access resources and attract customers. Shared sustainability values with key stakeholders (e.g., regulators, consumers) increase SME legitimacy, making it easier to access green finance, secure certifications, and enter new green markets. This legitimacy function is especially important because SMEs must distinguish substantive sustainable diversification from symbolic green claims or superficial compliance.

Proposition 3a. Cognitive capital—defined as shared sustainability values, norms, and interpretive frameworks—positively influences SMEs' stakeholder alignment, strategy development, and legitimacy building in green industries.

Proposition 3b. The positive relationship between cognitive capital and SME sustainable diversification is stronger when shared sustainability values are supported by concrete standards, credible practices, and stakeholder recognition.

3.5 Integrative Mechanisms: The Synergy of Social Capital Dimensions

While each dimension of social capital operates through distinct mechanisms, their effectiveness is enhanced through synergy. For example, structural capital provides the network ties necessary to form relationships, relational capital strengthens trust and reciprocity within these ties, and cognitive capital ensures that relationships are guided by shared sustainability goals and standards. Together, these dimensions create a comprehensive resource-access and capability-building system for SMEs. For instance, an SME in green logistics might use structural capital, such as membership in a green business association, to connect with potential partners, build relational capital through trust-based interaction, and leverage cognitive capital through shared sustainability values to collaborate on developing electric vehicle delivery services. This synergy enables the SME to overcome financial constraints through access to association grants, technological constraints through access to partner expertise, and informational constraints through access to industry best practices simultaneously. However, synergy should not be seen as the addition of more network ties. It hinges on whether there is reinforcement across the three dimensions and whether SMEs are able to turn external resources into diversification payoffs. When networks are closed, redundant or driven by narrow shared beliefs, the same social capital that facilitates coordination can also lock in SMEs and reduce their exposure to new green opportunities.

Proposition 4a. The joint presence and mutual reinforcement of relational, structural, and cognitive social capital have a positive synergistic effect on SME sustainable diversification, such that the combined effect exceeds the sum of their individual effects. This is conceptualized as a synergistic interaction effect among the three distinct dimensions—rather than as a single higher-order social capital construct—because each dimension retains its separate antecedents and mechanisms (resource sharing, network access, and shared cognition) while their joint presence produces emergent value that no single dimension supplies alone. Future empirical tests should therefore model the three dimensions as separate predictors and examine their multiplicative (interaction) terms, rather than aggregating them into one composite scale.

Proposition 4b. The synergy among social capital dimensions is weakened when networks are closed, redundant, or overly embedded, because these conditions limit access to novel resources and alternative green opportunities.

4. Boundary Conditions and Conversion Mechanisms

4.1 Institutional Context

The institutional context significantly moderates the relationship between social capital and SME sustainable diversification into green industries. Institutional context includes formal institutions, such as laws, policies, regulations, green finance schemes, certification systems, and public procurement mechanisms, and informal institutions, such as social norms, cultural values, and societal expectations regarding sustainability. Supportive formal institutions—such as green finance policies, tax incentives for green investments, and simplified green certification processes—enhance the value of social capital by reducing the costs and risks of green diversification. For example, a government grant program for green SMEs can complement structural capital by providing additional resources to SMEs that leverage network ties to access the program. Conversely, unsupportive formal institutions—such as ambiguous green regulations, unstable policy

incentives, or high certification costs—can undermine the effectiveness of social capital by increasing the barriers to green industry entry, even for SMEs with strong social networks. Thus, institutional context functions as a boundary condition: it determines whether social capital can be translated into legitimate, compliant, and economically viable green diversification outcomes.

Informal institutions, such as societal norms around sustainability, also moderate the relationship. In regions where sustainability is highly valued, cognitive capital (shared sustainability values) is more likely to facilitate stakeholder engagement and legitimacy building, enhancing the effectiveness of social capital. For example, in a country with strong cultural norms around environmental protection, an SME leveraging cognitive capital to promote green products is more likely to attract customer support and access resources than in a region with weak sustainability norms. However, the opposite may occur when sustainability norms are weak, fragmented, or largely symbolic. In such contexts, SMEs may find it difficult to convert social capital into market acceptance, policy support, or stakeholder legitimacy.

Institutional differences may also alter the relative value of the three dimensions of social capital. In settings with established green finance systems, transparent certification procedures, and accessible public support, structural capital can help SMEs connect with specialized institutions and obtain resources beyond their existing networks. Where formal support is limited or difficult to access, SMEs may depend more heavily on trusted partners and informal resource-sharing arrangements. Such dependence can provide short-term support but may also restrict access to alternative financing, technologies, and markets. Consequently, the effectiveness of social capital depends not only on the availability of institutional support but also on whether existing relationships allow SMEs to reach resources outside their established networks.

Proposition 5. Supportive institutional contexts—characterized by stable green policy incentives, transparent certification procedures, and accessible green finance schemes—strengthen the positive relationship between social capital and SME sustainable diversification, because they reduce entry uncertainty, improve regulatory legitimacy, and expand SMEs' ability to convert network-derived information into policy-aligned compliance and market access. Conversely, in unsupportive or highly volatile institutional contexts, the positive effect of social capital is attenuated or may even become insignificant.

4.2 Organizational Absorptive Capacity

Organizational absorptive capacity—the ability of a firm to identify, assimilate, transform, and exploit external knowledge—plays a dual yet distinct role in linking social capital to sustainable diversification. To avoid conceptual overlap, it is important to distinguish the two roles clearly. The mediating role answers the question of whether social capital is converted into outcomes at all: absorptive capacity is the internal process through which externally accessed resources become usable green capabilities. The moderating role, by contrast, concerns whether the absorptive capacity already available to an SME influences how effectively it benefits from external network resources. Although these roles concern the same underlying organizational capability, they can be distinguished theoretically by their temporal position: pre-existing absorptive capacity may condition the value of external resources, while subsequent knowledge-conversion processes may help explain how those resources contribute to sustainable diversification. First and foremost, absorptive capacity serves as a conversion mechanism (mediator) through which external network resources are internalized into usable green capabilities. For example, an SME with high absorptive capacity can effectively identify valuable green technologies through structural ties (acquisition), understand implementation requirements (assimilation), integrate them with existing production processes (transformation), and apply them to develop new green products or services (exploitation). Without this internal conversion process, access to social capital remains a latent asset rather than an actionable driver of diversification. This mediating role explains why some SMEs with rich networks still fail to diversify: they lack the internal routines to absorb and apply the external knowledge obtained.

Second, the absorptive capacity that SMEs possess before obtaining new network resources may condition the effectiveness of social capital. Firms with established routines for recognizing, interpreting, and using external knowledge are better positioned to benefit from new partnerships and resource-sharing opportunities. In this sense, initial absorptive capacity may strengthen the relationship between social capital and sustainable diversification. This moderating role should be distinguished from the mediating role discussed above. The former concerns organizational capabilities already available when new external resources are accessed, whereas the latter concerns the subsequent knowledge-conversion process. Future longitudinal studies could examine these roles by measuring initial absorptive capacity separately from later capability development and diversification outcomes.

Proposition 6a. Absorptive capacity mediates the relationship between social capital and SME sustainable diversification: external resources accessed through social capital are converted into internal green capabilities only to the extent that SMEs possess the acquisition, assimilation, transformation, and exploitation routines necessary to internalize external knowledge. In this mediating role, absorptive capacity is the proximal cause of sustainable diversification, with social capital acting as the distal antecedent that supplies the raw material (external resources and knowledge) for that conversion.

Proposition 6b. SMEs' pre-existing absorptive capacity positively moderates the relationship between social capital and sustainable diversification, such that the benefits of network-derived resources are stronger among firms with higher initial levels of absorptive capacity. This moderating effect is conceptually distinct from the mediating process proposed

in Proposition 6a: initial absorptive capacity reflects organizational readiness to use external knowledge, whereas the mediating mechanism concerns the subsequent development and application of knowledge-conversion capabilities.

4.3 Sectoral Differences in Green Diversification

The role of social capital in SME sustainable diversification may vary across green industry sectors. Green industries are not homogeneous. Renewable energy, eco-friendly manufacturing, sustainable agriculture, green logistics, and circular economy services differ in technological intensity, regulatory requirements, certification procedures, capital needs, and stakeholder structures. Therefore, the relative importance of relational, structural, and cognitive capital may differ across sectors. For example, renewable energy and green logistics often require strong structural capital because SMEs need access to infrastructure providers, policy programs, technical standards, and regulatory approval. By contrast, sustainable agriculture and eco-friendly products may rely more heavily on relational and cognitive capital because trust, local stakeholder support, consumer values, and certification credibility strongly influence market acceptance.

Sectors also display differences in the type of resource constraints SMEs face. Technology-intensive green sectors may need more external knowledge and higher absorptive capacity, whereas community-based or consumer-oriented green sectors may need more legitimacy and stakeholder involvement. Hence, the same type of social capital may or may not lead to similar outcomes in different sectors. A dense local network may facilitate entry into sustainable agriculture, but may be irrelevant for an SME desiring to enter into renewable energy markets with their specialized technical knowledge and formal regulatory access requirements. Thus, sector conditions should be considered as an important contingency in explaining SME sustainable diversification.

Proposition 7. The relative importance of relational, structural, and cognitive social capital for sustainable diversification varies across green industry sectors: structural capital is more critical in technology-intensive and regulation-dependent sectors (e.g., renewable energy, green logistics), whereas relational and cognitive capital are more influential in stakeholder-sensitive sectors (e.g., sustainable agriculture, eco-friendly consumer goods). More explicitly, sectoral conditions moderate the relative (not merely absolute) effects of the three social-capital dimensions on sustainable diversification: the same dimension can be a primary enabler in one sector and a secondary or negligible factor in another. Researchers should therefore test sector as a multi-category moderator interacting with each dimension separately, rather than assuming uniform effects across green industries.

4.4 The Dark Side of Social Capital

While social capital facilitates SMEs' access to external resources, it may also hinder sustainable diversification under specific circumstances. First, network lock-in takes place when SMEs stick to more familiar partners and routines. In this way, SMEs may reduce their exposure to new technologies, unfamiliar markets, and alternative forms of sustainability. Second, over-embeddedness hampers strategic flexibility. When SMEs are very embedded in closed networks, they might give preference to the known green partners rather than more suitable green partners and more demanding sustainability standards. Finally, groupthink happens when the beliefs of SMEs become too homogeneous. In this case, cognitive capital benefits from coordination, but hampers critical reflection and decreases openness towards new green opportunities.

Exclusion of new actors is yet another risk. Dense networks can protect their members but exclude access to new partners, start-ups, research institutions or external sustainability experts. This limits the diversity of knowledge accessible to SMEs and hampers the development of green innovations. These risks illustrate the dual role of social capital. Social capital can facilitate sustainable diversification if networks are open, diverse and sustainability-oriented. However, social capital hampers diversification if networks become closed, redundant and change-resistant. These risks suggest that the value of social capital depends on the diversity, openness, and adaptability of SME networks rather than their strength or density alone. Excessive dependence on established relationships may restrict access to alternative partners, while exclusionary arrangements can limit opportunities for knowledge acquisition, capability development, and entry into new green markets.

The risks of network lock-in, over-embeddedness, groupthink, and exclusionary closure are not uniformly distributed; they are more likely to emerge under specific conditions. First, network lock-in and over-embeddedness become particularly harmful when SMEs rely predominantly on bonding ties (strong, homogeneous relationships) without maintaining bridging ties to distant or unfamiliar actors. In such cases, the comfort of repeated interaction discourages exploration of alternative green technologies, unfamiliar market segments, or more demanding sustainability standards. Second, groupthink intensifies when cognitive capital is built around highly narrow or dogmatic sustainability beliefs—for example, when all network members subscribe to a single eco-certification standard without questioning its adequacy or considering emerging alternatives. Third, exclusionary ties are most acute in sectors where incumbents control access to critical institutional resources (e.g., green subsidies, certification bodies) and use dense intra-industry networks to screen out new entrants, start-ups, or external sustainability experts. Fourth, these dark-side effects are amplified in stable, low-competition institutional environments, where SMEs have fewer incentives to refresh their network portfolios. Conversely, in dynamic institutional contexts with frequent policy updates, technological shifts, or changing consumer expectations, SMEs are more likely to recognize the costs of over-embeddedness and proactively diversify their network ties.

Proposition 8. The positive relationship between social capital and SME sustainable diversification weakens when SMEs

experience network lock-in, over-embeddedness, groupthink, or exclusionary network closure. This weakening effect is more pronounced (a) when bonding ties dominate over bridging ties, (b) when shared cognitive frameworks are highly narrow or dogmatic, and (c) when institutional environments are stable and competition is low, reducing the urgency for network renewal.

5. Discussion

5.1 Sustainable Development Outcomes and SDG Alignment

A major aim of this framework is to articulate how SME sustainable diversification contributes not merely to firm-level growth, but to broader sustainable development. Green diversification should be assessed not only by whether SMEs enter new markets and create new revenues, but by whether diversification renders the economy more resilient, the environment better protected, and social value created. This distinction is crucial because expanding into green industries does not automatically equate to sustainable development outcomes. The outcomes depend on whether green activities generate benefits beyond private profitability.

Our framework explains how each dimension of social capital contributes to specific SDG-aligned outcomes through distinct mechanisms.

Relational capital, rooted in trust and reciprocity, enables collaborative resource sharing, informal financing, and knowledge transfer. These mechanisms directly support SDG 17 (Partnerships for the Goals) by fostering trust-based co-investment and joint problem-solving among SMEs, suppliers, customers, and research institutions. For example, when an SME secures advance payments from a trusted buyer to fund organic certification, it exemplifies how relational capital facilitates the cross-sector partnerships central to SDG 17. Furthermore, by enabling access to resources for green job creation—such as funding for retraining workers in eco-friendly production—relational capital contributes to SDG 8 (Decent Work and Economic Growth). The trust embedded in these relationships reduces transaction costs and uncertainty, making long-term investments in green skills and employment more feasible for resource-constrained SMEs.

Structural capital, characterized by network ties and institutional connections, provides SMEs with access to green industry networks, certification bodies, government support programs, and diverse external resource pools. These mechanisms underpin SDG 9 (Industry, Innovation and Infrastructure) by connecting SMEs to innovation clusters, research partnerships, and technology transfer platforms that facilitate the adoption of cleaner production technologies. Simultaneously, structural capital supports SDG 12 (Responsible Consumption and Production) by linking SMEs to circular economy value chains, certification systems (e.g., eco-labels, carbon footprint standards), and institutional frameworks that promote resource efficiency and waste reduction. For instance, an SME that leverages its industry association membership to access government grants for electric vehicle fleets demonstrates how structural capital translates network access into measurable progress toward SDG 12 targets.

Cognitive capital, based on shared sustainability values, norms, and interpretive frameworks, enables aligned strategy development, effective stakeholder engagement, and legitimacy building. These mechanisms are essential for SDG 13 (Climate Action) because they ensure that SME diversification efforts are guided by credible climate goals, measurable emission reduction targets, and adherence to low-carbon standards. Cognitive capital helps SMEs distinguish substantive environmental practices from symbolic green claims, thereby building the institutional legitimacy needed to attract climate-conscious investors and customers. It also contributes to SDG 12 by fostering a deep organizational commitment to responsible production that goes beyond regulatory compliance. Moreover, when cognitive capital aligns diverse stakeholders—such as local communities, regulators, and industry peers—around shared sustainability visions, it facilitates the multi-stakeholder collaboration central to SDG 17.

In sum, social capital contributes to SDG-aligned outcomes through distinct yet interconnected mechanisms. Relational capital builds the trust base for cross-sector partnerships (SDG 17); structural capital provides network access to innovation clusters and circular value chains (SDG 9 and SDG 12); and cognitive capital aligns strategic intent with credible climate goals and responsible production norms (SDG 13 and SDG 12). However, these pathways are conditional: they materialize only when SMEs possess sufficient absorptive capacity to convert external resources into internal capabilities, and when institutional environments provide stable policy signals and legitimacy support. Thus, the relationship between social capital, sustainable diversification, and SDG alignment is not automatic but operates through clearly specified, mechanism-based conditional pathways.

5.2 Theoretical Implications

This study's theoretical framework offers several contributions to the literature. First, the framework advances social capital theory by disaggregating its three dimensions and specifying their distinct mechanisms in the context of SME green diversification. Whereas prior studies often treat social capital as a unitary construct or focus on broad outcomes, our framework demonstrates how relational, structural, and cognitive capital each address distinct resource constraints—financial, technological, informational, and human. More importantly, it explains how social capital becomes developmentally meaningful only when external network resources are converted into internal diversification capabilities and subsequently linked to measurable economic, environmental, and social outcomes.

Second, the study integrates the resource-based view with social capital theory [26] to explain how intangible social resources can compensate for tangible resource deficits in SMEs. This integration addresses a gap in the resource-based view literature, which has traditionally focused on internal tangible resources, by highlighting the role of external social resources in enabling strategic diversification. It also extends the literature on SME “liability of smallness” by identifying social capital as a key strategic resource for overcoming this liability in the context of green transition. However, the study moves beyond a simple resource-compensation argument. It shows that access to social capital is not sufficient by itself. SMEs must also possess absorptive capacity to interpret, integrate, and apply external green knowledge.

Third, the study identifies and elaborates on the boundary role of institutional context and the conversion role of absorptive capacity, providing a more comprehensive understanding of the contextual factors that shape the effectiveness of social capital. This contributes to the literature on SME green transition by moving beyond a one-size-fits-all approach to social capital utilization, recognizing that its value depends on both external institutional conditions and internal organizational capabilities. The study also contributes by incorporating the dark side of social capital into the framework. Network lock-in, over-embeddedness, groupthink, and exclusionary ties help explain why some SMEs with strong social capital may still fail to achieve sustainable diversification. This provides a more balanced and conditional explanation of social capital in green transition.

5.3 Practical and Policy Implications

The framework offers practical insights for SME managers and policymakers seeking to facilitate SME sustainable diversification into green industries. For managers, social capital should be actively managed rather than passively accumulated. For policymakers, SME green transition requires institutional platforms that connect firms with finance, knowledge, certification support, and credible partners.

5.3.1 Implications for SME Managers

SME managers can use four strategies to cultivate and apply social capital for green diversification.

Cultivate relational capital through trust-building: Managers should build long-term relationships with green suppliers, sustainability-focused customers, industry peers, and technical partners. They should also assess whether these relationships provide relevant and non-redundant green resources rather than relying only on familiar partners.

Strengthen structural capital through network engagement. Managers should engage with green business associations, sustainability consortia, government agencies, certification bodies, and research institutions. They should also develop bridging ties beyond existing local networks to access new technologies, market information, and unfamiliar green opportunities.

Develop cognitive capital through sustainability alignment. Managers should define clear sustainability goals and align business strategies with industry standards and stakeholder expectations. Sustainability claims should be supported by concrete standards, credible practices, and measurable improvements rather than symbolic green language.

Enhance absorptive capacity. Managers should train employees in sustainability and green technologies, hire personnel with green expertise, and develop routines for identifying and applying external green knowledge. These efforts help SMEs convert network-based resources into green product development, process upgrading, certification readiness, and market entry.

5.3.2 Implications for Policymakers

Policymakers can design institutional environments that help SMEs use social capital for green diversification. Policy support should go beyond subsidies by strengthening the networks, standards, and learning systems through which SMEs transform external resources into sustainable diversification capabilities.

Facilitate stakeholder networks. Policymakers should support green business networks, clusters, and consortia that connect SMEs with large firms, research institutions, investors, certification bodies, and local governments. These platforms can reduce transaction costs, support knowledge sharing, and help SMEs participate in green value chains and regional sustainability transitions.

Provide targeted green policy support. Policymakers should combine tax incentives, grants for collaborative green projects, green finance programs, and simplified certification processes. Clear and stable policy signals reduce the risks and costs of green diversification and strengthen the value of SME networks.

Promote sustainability norms. Policymakers can support public awareness campaigns and industry standards that strengthen shared understanding of sustainability among SMEs and stakeholders. These norms should be linked to credible standards and monitoring mechanisms to encourage substantive green transformation rather than superficial compliance.

Support absorptive capacity building. Policymakers should fund training programs, SME–research partnerships, and sustainability consulting services to help SMEs absorb and apply external green knowledge. Such programs are especially

important in technology-intensive green sectors, where access to knowledge is insufficient without internal learning capacity.

Prevent exclusionary network effects. Policymakers should ensure that green transition programs do not benefit only well-connected SMEs. Open-access platforms, transparent application procedures, and inclusive partnership mechanisms can help smaller and less connected SMEs participate in green industry development.

6. Limitations and Future Research Directions

6.1 Limitations

This study has several limitations. First, the proposed framework is conceptual and has not been empirically validated. Although its mechanisms are informed by existing research, the relationships among the three dimensions of social capital, absorptive capacity, institutional context, and sustainable diversification remain theoretical propositions. Future empirical research is needed to examine the strength and direction of these relationships and determine whether the proposed mechanisms operate as expected.

Second, the framework addresses SMEs across different green industries without testing sector-specific differences. Renewable energy, sustainable agriculture, green manufacturing, and circular economy activities vary in their technological requirements, regulatory obligations, and resource needs. These differences may affect both the usefulness of social capital and the organizational capabilities required for successful diversification. The relative importance of the proposed mechanisms may therefore differ across sectors.

Third, the framework draws partly on literature and policy discussions concerning European institutional settings. Its applicability to other regions should not be assumed without further investigation. SMEs operating in emerging economies may face different levels of policy support, financial development, regulatory enforcement, and institutional accessibility. These differences could alter how social capital facilitates resource access and how external resources are converted into green capabilities. The framework should therefore be understood as a set of theoretically grounded relationships whose applicability across institutional contexts remains to be examined.

Finally, although the framework recognizes the potential disadvantages of social capital, it does not establish when network dependence, over-embeddedness, groupthink, or exclusionary relationships become sufficiently restrictive to undermine sustainable diversification. The proposed negative mechanisms require further investigation, particularly in settings where SMEs rely heavily on a limited number of established partners. Future studies could examine whether network diversity and access to alternative institutional resources reduce these risks.

6.2 Future Research Directions

Future empirical research should distinguish the measurement of social capital, absorptive capacity, green capabilities, sustainable diversification, and sustainability-related outcomes. Although these constructs are theoretically connected, they represent different aspects of the proposed framework and should not be treated as interchangeable.

Relational capital may be measured through multi-item survey scales assessing trust, reciprocity, relationship quality, and willingness to share resources with suppliers, customers, and other business partners. Structural capital may be assessed through network size, tie diversity, bridging relationships, and connections with industry associations, research institutions, and government agencies. Cognitive capital may be captured through shared sustainability values, common goals, and mutual understanding of environmental standards among network partners.

Absorptive capacity may be operationalized through four dimensions: knowledge acquisition, assimilation, transformation, and exploitation. These dimensions reflect SMEs' ability to identify relevant external green knowledge, understand its implications, integrate it with existing organizational practices, and apply it to business activities. Established absorptive-capacity measurement approaches may provide a basis for developing context-appropriate indicators [27].

Green capabilities should be distinguished from absorptive capacity and from realized diversification outcomes. Potential indicators include the ability to adopt environmentally sustainable technologies, implement cleaner production processes, meet green certification requirements, and integrate environmental knowledge into product or service development. These indicators capture organizational readiness and implementation capabilities rather than completed entry into new green markets.

Sustainable diversification may be assessed through the introduction of new green products or services, entry into additional green markets, participation in sustainable value chains, and the proportion of business activities or revenue associated with new green operations. Sustainability-related outcomes should be evaluated separately across economic, environmental, and social dimensions. Potential indicators include changes in revenue diversification, resource efficiency, greenhouse gas emissions, waste reduction, green employment, and employee skill development. Where feasible, these measures should be supported by objective business records, environmental performance data, or independently verified sustainability information rather than relying exclusively on managerial perceptions.

These measurement distinctions would allow future research to examine whether social capital is associated with stronger absorptive capacity, whether knowledge conversion supports green capability development, and whether sustainable diversification produces measurable sustainability benefits. Previous research on SMEs has also examined the mediating role of absorptive capacity in the relationship between network embeddedness and innovation performance [28]. This provides a relevant basis for future investigations of how network-derived resources contribute to organizational capability development.

Based on the limitations and contributions of this study, the following future research directions are proposed:

Empirical validation of the conceptual framework: Future studies could use longitudinal survey designs to examine how social capital, absorptive capacity, and sustainable diversification develop over time. Structural equation modeling could be applied to assess the measurement properties of the principal constructs and test the proposed indirect relationships. A longitudinal design would be particularly useful for distinguishing the mediating role of subsequent knowledge-conversion processes from the moderating role of absorptive capacity measured before the acquisition of new network resources. Regression-based interaction analysis or multi-group comparisons could examine differences across institutional and sectoral contexts. To reduce reliance on self-reported measures, researchers could combine survey responses with business records and environmental performance indicators. Comparative case studies could further investigate why SMEs with similar network resources achieve different green diversification outcomes, particularly where institutional support and network openness vary.

Sector-specific analysis: Future studies should examine how social capital operates in specific green sectors, such as renewable energy, sustainable agriculture, green logistics, eco-friendly manufacturing, and circular economy services. Such comparisons would clarify whether relational, structural, or cognitive capital matters more under different technological, regulatory, and market conditions.

Cross-regional comparisons: Future research should compare SMEs across different institutional contexts, such as European, Asian, African, and Latin American countries. This would help assess whether the proposed framework applies to emerging economies where resource constraints are stronger and formal green support may be weaker.

Beyond describing contextual variation, the framework offers theoretical predictions concerning institutional differences. Where formal green support is limited, connections to public institutions may provide fewer immediately accessible resources. Under such conditions, trusted relationships and shared sustainability commitments may become particularly important, although bridging ties to alternative private, community, and cross-sector partners can remain valuable. However, informal relationships cannot necessarily compensate for the absence of formal financing, certification systems, or regulatory support. Conversely, in more supportive institutional environments, accessible policy programs and transparent standards may increase the value of structural capital by facilitating connections with specialized institutions. These expectations require empirical examination across different institutional settings.

Exploring the dark side of social capital: Future studies should examine how network lock-in, over-embeddedness, groupthink, and exclusionary ties constrain SME green diversification. They should also identify mitigation strategies, such as building bridging ties, rotating partnership portfolios, and creating more open innovation networks.

Digital social capital in green transition: Future research should explore how online sustainability communities, digital platforms, and virtual industry networks support SME green diversification. It should also examine whether digital platforms reduce exclusionary network effects or reproduce them in new forms.

Measurement of sustainable development outcomes: Future research should examine whether SMEs' entry into green industries produces sustained improvements in economic, environmental, and social performance. Longitudinal observations would help distinguish short-term diversification activities from longer-term sustainability outcomes. Studies could also investigate whether economic gains coincide with measurable environmental improvements and social benefits, rather than assuming that participation in green industries necessarily advances all three dimensions of sustainability.

7. Conclusion

This study develops a conceptual framework explaining how SMEs leverage the three dimensions of social capital—relational, structural, and cognitive—to overcome resource constraints and achieve sustainable diversification into green industries. The framework identifies distinct mechanisms through which each dimension operates: relational capital facilitates collaborative resource sharing, informal financing, and knowledge transfer; structural capital enables access to institutional support, industry network integration, and bridging to diverse resource pools; and cognitive capital supports aligned strategy development, stakeholder engagement, and legitimacy building. Additionally, the study highlights the synergy between these dimensions and the boundary role of institutional context and the conversion role of organizational absorptive capacity. The central argument is that social capital supports sustainable diversification not merely by granting access to external resources, but by enabling SMEs to interpret, absorb, and convert those resources into actionable green capabilities—including new products, services, processes, and market positions.

The theoretical contributions of this study include advancing social capital theory in the context of SME green transition,

integrating the resource-based view with social capital theory, and identifying key contextual and organizational conditions. More importantly, the study offers a conditional explanation of social capital. It shows that social capital is not automatically beneficial. Its positive effects depend on absorptive capacity, supportive institutional environments, sectoral conditions, and the openness and diversity of network ties. Network lock-in, over-embeddedness, groupthink, and exclusionary ties may weaken or even constrain SME sustainable diversification. Practically, the framework provides actionable insights for SME managers to cultivate and utilize social capital, and for policymakers to design supportive institutional environments that foster SME participation in green industries. These insights emphasize not only firm-level strategy, but also the need for inclusive networks, credible standards, and institutional platforms that help SMEs participate in sustainable development.

As the global green transition accelerates, SMEs occupy a critical position at the intersection of environmental sustainability, economic resilience, and social value creation. By strategically leveraging social capital to overcome persistent resource constraints, they can unlock the opportunities offered by green industries and contribute to more sustainable and inclusive development pathways. This contribution can be understood in relation to SDG-related outcomes, including decent work and green growth, sustainable innovation, responsible production, climate action, and partnerships for sustainability. Future research should build on this framework to empirically validate its propositions and explore sector-specific and cross-regional variations, further enhancing our understanding of social capital's role in SME green diversification. Such research will help clarify when social capital becomes a driver of sustainable development and when it remains limited by organizational, institutional, or network-based constraints.

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Conflict of Interest

The authors declare no conflict of interest.

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