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REVIEW

ESG as a Strategic Asset in Emerging Markets: A Case Study of Renewable Energy Technology Transfer and Marketing

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ABSTRACT

Environmental, social, and governance (ESG) considerations are increasingly framed as sources of competitive advantage. Yet evidence remains fragmented on how ESG creates strategic value in emerging markets where institutional uncertainty, stakeholder contestation, and financing constraints shape renewable energy deployment. This review conceptualizes ESG as a strategic resource, an embedded competency that improves project administration, validity, and learning practices, and reviews the role of ESG in renewable energy technology transfer and downstream marketing/commercialization results. By combining findings on resource-based view, institutional theory, stakeholder theory, signaling, and technology transfer, we come up with an explicatory pathway between ESG maturity and partner selection, choice of transfer mode, bankability, absorptive capacity, and lifecycle performance. We also relate the outcome of operations to market-facing processes, as the argument is that ESG influences tender eligibility, cost of capital, ecosystem coordination, and adoption through lower perceived risk and an increase in credibility among regulators, financiers, communities, and buyers. The comparison of a case of China and Germany demonstrates two prevailing ways: an execution-centered way in which ESG builds value by reliability and reduction of disruption, and a verification-centered way in which ESG builds value by safeguards, standards, and credible signaling. At cross-pathways, the strategic usefulness of ESG relies on local fit as well as on how the commitments can be converted into quantifiable results like transfer of skills, development of suppliers, affinity of communities, and reliable energy supply. Managerial and policy implications and a research agenda are concluded at the end of the review in the form of causal identification, longitudinal design, and distributional just

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ARTICLE INFO

Received: 15 March 2026 | Revised: 6 May 2026 | Accepted: 15 May 2026 | Published Online: 11 August 2026
DOI: https://doi.org/10.30564/jees.v8i8.13284

CITATION

Ma, Y., 2026. ESG as a Strategic Asset in Emerging Markets: A Case Study of Renewable Energy Technology Transfer and Marketing. Journal of Environmental & Earth Sciences. 8(8): 127–154. DOI: https://doi.org/10.30564/jees.v8i8.13284

transition outcomes in contexts of emerging markets.

Keywords: ESG; Emerging Markets; Renewable Energy; Technology Transfer; Marketing Commercialization

1. Introduction

The shift to low-carbon energy systems across the world has brought environmental, social, and governance (ESG) concerns to the margins of corporations and countries as mere instruments of compliance[1]. This change is particularly great in the emerging markets, where the speed of economic growth, the growth of energy demand, and an increase in climate vulnerability meet institutional limitations and social development. Renewable energy implementation in such situations is not a technology or an environmental necessity, but also a strategic and socio-political project. It is based on this context that ESG has been more and more viewed not as a system of reporting or ethical requirements, but as a possible strategic asset that can influence the competitive positioning of firms, the outcomes of technology transfer, and market performance[2–4].

Most of the global energy requirement and renewable energy potential in the next few decades can be attributed to emerging markets. Nevertheless, the renewable energy projects in these markets experience unique challenges, such as uncertainty in regulation, poor infrastructure, funding sources, governance risk, and challenging stakeholder environments that comprise governments, local population, foreign investors, and civil society groups[5]. These obstacles increase the risks of cross-border transfer of renewable energy technology, which has been a vital tool through which emerging economies have tapped into advanced technologies, administrative proficiency, and operational skills. Although the technical, financial, and policy aspects of renewable energy diffusion have been previously studied, comparatively little literature has considered the strategic aspect of ESG in supporting/limiting technology transfer and commercialization in the market in the context of emerging market conditions[6,7].

At the firm level, accordingly, it is classic to perceive ESG as a risk management or legitimacy-seeking instrument, to reduce regulatory, reputational, and operational risks. In more recent times, researchers have started to posit that ESG can be used as a resource of value, which drives growth in long-term performance, innovation, and relations with stakeholders. This strategic approach is consistent with the views of resource-based and dynamic capability, which focus on how intangible resources, including reputation, trust, and organizational routines, can be used to create sustained competitive advantage. These intangible ESG-related capabilities can also be especially useful in the case of emerging markets in which institutional voids and ineffective enforcement mechanisms tend to dominate. Effective governance practices can lower transaction costs and corruption risks; effective social engagement can ensure acceptance by the community and a license to operate; and believable environmental management can open up access to global finance and risk mitigation facilities. However, how ESG is transformed into practical benefits of renewable energy technology transfer and market performance is still poorly theorized and empirically incorporated[8,9].

At the firm level, the traditional conception of ESG has always considered it as a risk management mechanism or a legitimacy-seeking mechanism, meant to reduce regulatory, reputational, and operational risks[10]. In more recent times, however, researchers started to claim that ESG can serve as a source of value, which improves the long-term performance, the ability to innovate, and other relations with stakeholders. This school of thought is consistent with the resource-based and dynamic capability school of thought, which highlights the importance of intangible assets, including reputation, trust, and organizational routines, in creating sustained competitive advantage. These intangible ESG-related capabilities might be highly desirable in the case of emerging markets where institutional voids and low-quality enforcement mechanisms tend to dominate. Well-developed governance practices can ease the costs of transactions and corruption risks; good social participation may provide a license to operate and community approval; and believable environmental management may open doors to foreign finances and risk aversion facilities. However, the processes by which ESG is converted into real benefits in renewable energy technology transfer and market performance have not been theorized and integrated in an empirical way[11].

Simultaneously, practitioners show growing interest in the market-facing implications of ESG in the emerging markets, but they are not well researched in scholarly literature. The technologies of renewable energy frequently demand huge initial investment and the establishment of long-term contracts, which makes trust, credibility, and perceptions of risk core factors to adoption. ESG performance and disclosure may serve as indicators to a broad spectrum of market participants: the public procurement agency, corporate buyer, financier, and end consumer. ESG credentials can play a role in institutional markets, including utility-scale power generation or in public-private alliances, in prequalification procedures, tender reviews, and in obtaining concessional financing. ESG stories of the societal good, employment, and environmental responsibility can be used to form brand images and acceptance in distributed or consumer-facing segments. Nevertheless, the success of the marketing plans based on ESG in the new markets depends on the aspects of credibility, locality, and convergence with the priorities of the stakeholders, creating doubts related to greenwashing and communication gaps[12–14].

This paper addresses these gaps by supporting the progress of a comprehensive review and integrative analysis of ESG as a strategic resource in emerging markets, in terms of renewable energy technology transfer and marketing outcomes. Instead of viewing ESG as an exogenous limitation or a purely normative phenomenon, we conceive ESG as an endogenous strategic capability that plays off institutional environments, relations with partners, and market forces. Using the ESG, international business, technology transfer, and marketing literature, we expect to elucidate the effects of the ESG-related practices on global processes and performance of renewable energy projects[15].

There are three generalized questions used to guide the review. To begin with, in what circumstances can ESG be considered a strategic resource of companies involved in renewable energy operations in emerging markets? Second, how is the effectiveness of transfers of renewable energy technologies (selection of partners, absorption of knowledge, and execution of a project) affected by ESG? Third, what is the connection between ESG and market access, commercialization policies, and the adoption of renewable energy technologies by customers in such settings? The importance of answering these questions is not only to contribute to the development of theory, but also to provide information that would guide managerial and policy-making decisions when the emergent markets are taking center stage in the global decarbonization process[16].

The article is methodologically structured in terms of the review approach and a detailed case study synthesis. The review attempts to combine theoretical insights derived from the resource-based view, institutional theory, stakeholder theory, and signaling theory to help come up with a single conceptual framework. Based on this framework, the case study section demonstrates the way ESG strategies are implemented in reality and how they influence technology transfer channels and marketing performance in an emerging market environment. Such an integrated methodology will enable us to fill the gap between abstract theory and practice and emphasize patterns that can be generalized and contingencies that are context-specific[17].

There are three contributions of this article. First, it redefines ESG as a strategic resource that can proactively facilitate the transfer of renewable energy technologies and market success in new markets, as opposed to limiting the behavior of firms. Second, it collates formerly segregated literatures to provide a comprehensive perspective on ESG engagement with technological, institutional, and market processes. Third, it gives practical recommendations to managers, policymakers, and development finance institutions who may want to develop ESG frameworks that will help in achieving sustainable development and make them commercially viable[2,18–20].

The rest of the article is laid out in the following way. Section 2 describes the conceptual framework and theoretical perspectives of the analysis, which define ESG as a strategic resource and place it in the background of the emerging market environment. Part 3 looks into the contribution of the ESG in the transfer of renewable energy technology, especially the facilitating mechanisms, absorptive capacity, and the trade-offs involved. Part 4 examines the marketing and commercialization consequences of ESG, such as branding, customer uptake, and stakeholder communication. Section 5 provides a summary of a case study that illustrates the effect of ESG strategies on technology transfer and market performance in reality. Section 6 concludes with a summary of the main findings, theoretical and management implication, and future research directions[21–23].

2. Conceptual Foundations and Theoretical Lens

This part lays the conceptual foundation for understanding ESG as a strategic resource in emerging markets and why ESG can influence the outcomes of the transfer of renewable energy technology, as well as downstream marketing. We, instead of considering ESG as a checklist of compliance or as a device of pure reputation, place it as an organizational competence, and as such, it is exposed to institutional environments, stakeholder expectations, and market-creation processes. The main point is that ESG may be transformed into a strategically valuable asset by incorporating it into the routine of firms, their governance systems, partnering, and commercialization processes, especially in settings of uncertainty and institutional complexity that characterize most emerging markets [24].

2.1. ESG as a Strategic Asset: From Reporting Construct to Capability

ESG is typically presented in the context of disclosure: companies are engaged in offering information about emissions, labor practices, and corporate governance to please shareholders, investors, and other stakeholders. Whereas disclosure can be seen and quantified, it is not the same as ESG performance and ESG value creation. Strategically, ESG is consequential when it is applied as a long-lasting organizational competency that aids in decision-making, managing risks, operational reliability, and trusting the stakeholders. This difference is important since the emerging markets tend to have weak regulatory frameworks and their application lacks consistency, so symbolic ESG practices are easily shaken and even lead to an overall negative outcome. In this case, the existence of ESG statements is not what distinguishes the firms, but the extent to which ESG principles have been embedded into structures and routines that are resistant to shocks and scrutiny [2].

The idea of thinking of ESG as a strategic asset suggests that ESG leads to competitive advantage by operating in the same way as other intangible resources. First, ESG may create reputational capital, which reinforces the beliefs of the company among financiers, regulators, communities, and customers. Second, ESG has the capability of serving as relational capital, facilitating cooperative alliances, especially in cross-border ventures where the lack of trust and information asymmetry is the norm. Third, ESG may be considered as a governance competence that decreases the transaction cost and disruption risk that are caused by more transparent accountability structures, transparency regulations, and ethical protection. Fourth, ESG is able to speed up learning capacity by institutionalizing measurement, reporting, and constant improvement routines and processes that are directly applicable to technology-intensive sectors like renewable energy [25–27].

These assets are not abstract in the technology transfer of renewable energy. The quality of governance in a firm has an impact on contracting, procurement integrity, and anti-corruption limits; the social practices of the firm influence the workforce preparedness, safety culture, and acceptance in the community; and the environmental capabilities of a firm influence permitting, biodiversity management, and lifecycle stewardship. Based on this, ESG can be identified as a facilitating platform for the complex projects associated with long-term horizons, high capital investments, and coordination of multiple stakeholders.

2.2. The Emerging Market Context: Institutional Complexity and Strategic Imperatives

Emerging markets are not necessarily high-growth markets, but are frequently typified by institutional heterogeneity, policy volatility, gaps in infrastructure, and an uneven distribution of market intermediaries. These circumstances have an effect on the way and reason the ESG generates value. Under conditions where regulatory frameworks are being transformed, where enforcement is uneven, and where informal institutions are driving results, firms are at increased exposure to nonmarket risks, including delays, opposition of the community, changing subsidy regimes, and reputational crises that are being amplified by the media and civil society mechanisms. These risks do not lie at the margins of renewable energy projects; they often play a critical role in whether a project is financially closed, whether it achieves its construction schedule, and whether it continues to achieve its operational performance [28].

The high uncertainty may arise because of institutional voids, including poor enforcement of contracts, insufficient transparency, and poor labor and environmental

regulation, among others, among foreign investors and technology providers. Meanwhile, emerging markets are frequently characterized by a high salience stakeholder group of state agencies, local communities, and development finance actors that will influence them both formally and informally. With renewable energy, land usage, grid accessibility, and long-term offtake contracts at its core, stakeholder alignment emerges as the prerequisite for market entry and scalability. ESG practices thus may act as a bridging force between firm-level purposes and expectations by stakeholders, allowing a so-called license to operate and license to grow [29].

The financing environment is another characteristic. Emerging markets' renewable energy projects are often based on a combination of private funds, development finance, guarantees, and instruments supported by policies. Financing terms, due diligence results, and risk mitigation instruments are some of the aspects that can be affected by ESG performance and credibility. This is especially applicable in the transfer of technology, since the issue of funding is hardly decouplable from technology selection, supplier selection, and contract design. The strategic importance of ESG in emerging markets, therefore, is not confined to reputational advantages, but determines access to resources and the ability to implement cross-border projects [30–33].

2.3. Theoretical Lenses for an Integrated Framework

One theoretical framework cannot give a complete explanation of the role of ESG in technology transfer and marketing in new markets. As a review, therefore, it uses an integrated lens of strategic management, institutional analysis, stakeholder governance, and market signaling.

Resource-based view and dynamic capabilities perspectives can be applied to explain how ESG becomes an advantageous source when it is embedded, hard to copy, and constantly improved through learning. In this perspective, ESG is not a fixed quality but is an ability that assists companies to identify threats and opportunities, exploit them by means of concerted effort, and reorganize operations and alliances as situations evolve. This is evident in disciplined project governance, sound safety and environmental management, as well as adaptive stakeholder engagement in renewable energy projects, and can help to reduce delays, enhance reliability, and replicate in different markets [6].

The institutional theory justifies why ESG is a different issue in various contexts. In the situation when the institutional rules are insecure or disputable, firms would want to be legitimized to function and grow. ESG may deliver a legitimacy discourse and a practice that harmonizes the firm with the expectations of regulators, financiers, and civil society. Nevertheless, the institutional theory also brings a danger: companies might become ESG symbolic in order to seem to comply without necessarily changing their practices. It is especially risky when operating in new markets where the reputation may be weak, and the repercussions of perceived greenwashing can be as severe as political backlash, local opposition, and withdrawal of financing [18,24,34].

This is supplemented by the stakeholder theory, which concentrates on how companies cannot give priority to competing demands of the stakeholders. The trade-offs in renewable energy projects are often quite visible: the costs, speed, and performance goals can be in conflict with the land acquisition, livelihood effects, tariffs debate, and expectations of local employment. There is a possibility of ESG-oriented stakeholder management to decrease conflict and even heighten acceptance, yet it may also enhance short-term expenses and complexity. The ability to comprehend ESG as a strategic asset means that one must pay close attention to these trade-offs and the ability of a firm to address them in the long-run [35].

Signaling theory assists in relating ESG and market performance. Information asymmetries can tend to be high in new markets: investors can find it difficult to judge the quality of governance, customers can be concerned with reliability, and governments may be interested in finding believable partners in large infrastructure projects. Quality could be indicated by ESG disclosure, third-party verification, and stable performance, and perceived risk can be minimized. Signaling, however, can only be effective when it is believable, predictable, and expensive to counterfeit. This focus on credibility is indispensable to the interpretation of instances where ESG positively influences the marketing results and the instances where it is unable to convince unconvinced stakeholders [36].

Lastly, there is the technology transfer theory that incorporates the idea of absorptive capacity, which bridges the gap between ESG and operational results. The transfer of technology is not a single exchange; technology transfer is

a relationship process that is learning-based. The capability of the host firm to identify, internalize, adapt, and utilize knowledge will be the determining factor in the performance of transferred renewable technologies in local environments. Investments in training, safety systems, reporting discipline, and governance routines that are linked to ESG may enhance absorptive capacity to ensure that technology transfer results in long-term performance and does not end with the short-term project's completion.

2.4. Linking ESG to Technology Transfer and Marketing: Mechanisms and Pathways

A comprehensive framework necessitates the explanation of the pathways connecting ESG to two result domains: technology transfer effectiveness and marketing/commercialization success. The ESG functions in technology transfer in terms of selection of partners and governance compatibility, mitigation of risk and compliance preparedness, learning infrastructure and labor capacity, and acceptance of the stakeholders that minimizes the disruption of projects. Such mechanisms determine the initiation of a project as well as the mode of transfer that is adopted. More cooperative agreements, including joint ventures and long-term partnerships, may involve a greater need to trust and be governed by a common governance system than a transaction at arm's length. ESG maturity is thus able to increase the number of transfer modes that are viable, as well as enhance the intensity of knowledge-sharing [37–41].

ESG affects the perception of renewable energy firms in both procurement markets and in the marketing and commercialization of such products, and among end users. The commercialization of renewable energy in most of the emerging markets is institutional but not necessarily consumer-driven: the tenders, concessions, grid interconnection deals, and corporate power purchase deals prevail. ESG may influence the prequalification process and tender assessment by giving an indication of reliability, readiness to comply, and political acceptability. It may also influence willingness to collaborate between local firms, utilities, and financiers, therefore influencing access speed and channel access [2].

The two spheres are dependent on each other. Proper technology transfer would become an element of the ESG story in a firm, which would show the ability to build abilities locally, safety performance, and operational reliability, which enhances market trust and customer confidence. On the other hand, legitimate marketing claims of ESG rely on operational reality; in the event of failure of transfer of technology and poor performance of projects, ESG messaging will not be effective. The strategic importance of ESG, therefore, becomes most evident when the ESG practices assist in operational excellence and when the market communication effectively reflects that excellence [42–44].

2.5. Boundary Conditions and Key Constructs for the Review

The implications of ESG are not unbalanced, and to have a rigorous review, there is a need to identify boundary conditions. On the firm level, ESG maturity would determine whether ESG is symbolic or substantive. The more firms have stronger governance structures, internal controls, and measurement capabilities, the higher the chances that they translate ESG commitments into credible execution. It also depends on internationalization experience: the companies that are used to cross-border coordination and engage with stakeholders might be more appropriately positioned to make ESG operational in new institutional settings. Another firm-level consideration is the nature of the renewable technology. More sophisticated technologies, safety-related technologies, and technologies depending on specialized maintenance might increase the significance of ESG-based training systems, quality assurance, and knowledge transfer practices [45].

Institutional quality and policy stability at the country level determine the demand for ESG and the stature of its operation. Governance practices may have a strong impact on the transaction costs and trust between partners in a context where the risk of corruption is higher, or the enforcement is less intense. Social performance and community engagement can become the determinant of the continuation of a project when politically sensitive land use is at play, or the development story is a point of contention. The structure of the energy market is also important. In the case of a centralized and state-directed procurement, legitimacy and relations with the state actors might prevail. In markets with greater liberalization, there would be more importance of customer trust, service delivery, and competitive differentiation.

The level of salience is at the stakeholder level. In other contexts, the requirements of development finance in-

stitutions and international investors regarding ESG are very strict, which directly influences access to financing. In others, the local communities and the civil society organizations apply pressure on individuals by using social mobilization, exposure to the media, and political means. Such differences suggest that ESG should not be regarded as a universal lever, and the strategic challenge is to ensure that ESG investments are aligned with stakeholder groups that have the greatest influence on the feasibility of projects and their success in the market[46]. To ensure conceptual precision and enable consistent interpretation across the reviewed literature, **Table 1** summarizes the core constructs used in this article, their working definitions, and indicative operational measures. **Figure 1** integrates the article's theoretical lenses into a single pathway model that links ESG capabilities to technology transfer success and commercialization outcomes, while specifying boundary conditions that moderate these relationships.

Table 1. Core constructs, definitions, and indicative operationalization for ESG as a strategic asset, technology transfer, and commercialization outcomes in emerging markets.

Construct Family	Construct	Working Definition (In This Review)	Typical Operational Indicators (Examples)	Primary Theoretical Lens
ESG as strategic asset	Environmental capability	Firm routines that manage lifecycle environmental risk and compliance beyond minimum regulation	EIA quality, biodiversity mitigation plans, lifecycle waste plans, monitoring frequency	RBV/Institutional
ESG as strategic asset	Social capability	Practices that build workforce competence and stakeholder acceptance across the project lifecycle	Training hours, safety incident rates, grievance resolution time, local hiring share	Stakeholder/Dynamic capabilities
ESG as strategic asset	Governance capability	Controls that reduce opportunism, improve accountability, and increase transparency across partners and suppliers	Auditability, anti-corruption controls, procurement transparency, board oversight	RBV/Signaling
Technology transfer	Transfer mode	Governance form used to move technology/know-how across borders	Licensing, JV, EPC, BOOT, O&M contracts	IB/Transaction cost
Technology transfer	Absorptive capacity	Ability of host actors to recognize, assimilate, adapt, and exploit new knowledge	Local technical certifications, O&M competence, process standardization	Technology transfer
Commercialization	Market access	Ability to enter tenders, secure permits, obtain finance, and form channels	Prequalification pass rate, time to financial close, permitting duration	Institutional/Signaling
Commercialization	Credibility/Trust	Stakeholder belief that the firm will deliver reliably and responsibly	Repeat tenders won, stakeholder sentiment, verified reporting	Signaling/Stakeholder
Outcomes	Project performance	Delivery and operations performance over time	Delay days, LCOE, availability factor, curtailment resilience	RBV/Operations

Note: EIA, Environmental Impact Assessment; RBV, Resource-Based View; JV, Joint Venture; EPC, Engineering, Procurement, and Construction; BOOT, Build, Own, Operate, Transfer; O&M, Operations and Maintenance; IB, International Business; LCOE, Levelized Cost of Electricity.

Combined collectively, these boundary conditions can help to explain the extent of the review and how to interpret the conflicting results of previous studies. They also encourage the necessity of a case study synthesis, as the emerging markets vary extensively in terms of their institutional structure, stakeholder needs, and renewable energy commercialization channels. The goal of the rest of the article is thus not just to recap what has already been known, but to explain in what and why ESG becomes a strategic asset that can facilitate the transfer of renewable energy technologies and successful marketing, and when it is still an expensive signal with little effect on operations[24,47].

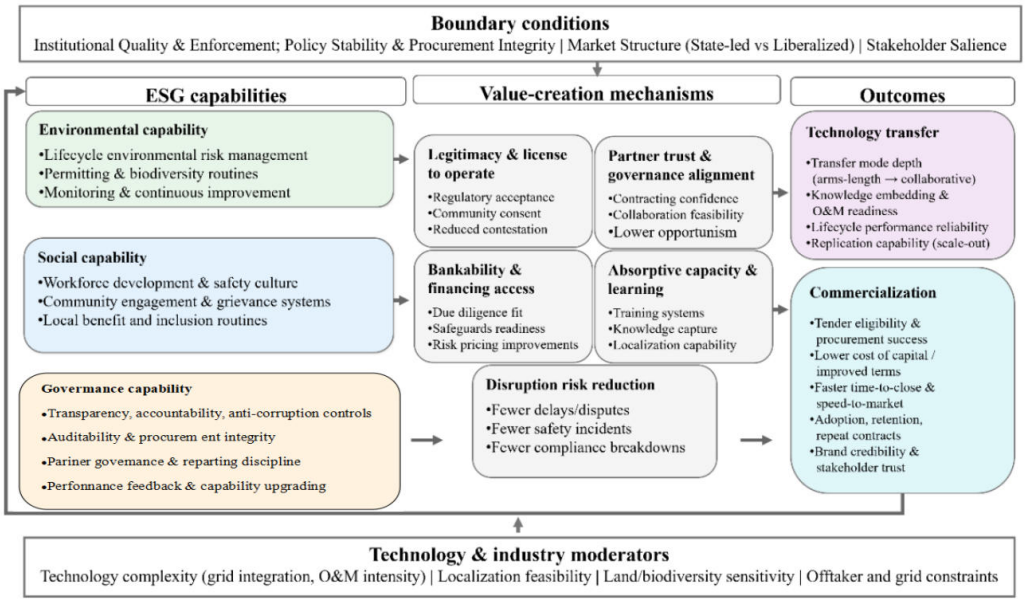

Figure 1. Integrated framework: ESG capabilities as strategic assets linking technology transfer mechanisms to commercialization outcomes under emerging-market boundary conditions.

3. ESG and Renewable Energy Technology Transfer

Technology transfer, Renewable energy is often introduced as a technical means of solving the decarbonization issue in developing economies. As it were, it is an intricate piece of organization and institution where equipment, intellectual property, routines of operation, and managerial know-how need to be converted into dependable action within localized limitations. The transfer of technology thus goes beyond the mobility of both artifacts and codified knowledge. It incorporates tacit learning, workforce formation, safety and quality routines, supplier development and governance practices, which can be used to facilitate long-term operations and maintenance. In the case of emerging markets, where regulatory regimes are arguably in transition, and project environments are generally typified by information asymmetries and contestation among stakeholders, ESG can be at the center of transfer results. ESG not only impacts the transfer or not, but the channel by which the transfer is taking place, the extent of knowledge being transferred, the pace at which it is executed, and the long-term performance once commissioned[48,49].

In this section, the author summarizes the nature of ESG functioning in the technology transfer lifecycle in renewable energy projects. ESG is discussed as related to the selection of partners, the designing of contracts and governance, the implementation and risk management of a project, the building of absorptive capacity, and social and political environments underpinning the license to operate of a project. It also analyzes the conflicts and unintended impacts when the ESG expectations come into conflict with local realities, and it explains why ESG can facilitate technology transfer in some situations but have minimal or even negative effects in others.

3.1. Technology Transfer in Renewable Energy: Forms, Stages, and Actors

There are various forms of technology transfer in the renewable energy sector, which vary in the extent of collaboration, control, and intensity of learning. The licensing systems, such as those, can be effective in terms of transferring the codified designs or manufacturing rights, but they usually depend on the prior existing technical competence and quality assurance capabilities in the host atmosphere. Joint ventures and strategic alliances facilitate greater knowledge sharing, shared governance, and joint investment in local strengths, yet demand greater trust and strong governance systems to avoid opportunism. Turnkey engineering-procurement-construction delivery can accelerate deployment, but can constrain local learning unless knowledge is actively instilled in the form of training, supplier develop-

ment, and practices of handing-over operations. The nature of renewable projects as lifecycle systems and not one-time constructions explains the development of hybrid models, including EPC and long-term operations and maintenance contracts or build-own-operate-transfers [50].

In all these modes, the transfer process may be thought of in terms of a series of steps, the first being pre-entry and partner selection, the second being contracting and financing, the third being project development and permitting, the fourth being construction and commissioning, and the fifth being operations and replication. Stages and various stakeholders are associated with various vulnerabilities. Government agencies interfere with site allocation, grid interconnection, and tariff structures. The ability of institutions to form project feasibility in the form of due diligence and risk pricing is done by development finance institutions, commercial banks, insurers, and export credit agencies. The local communities and civil society players influence the continuity of a project, especially where the biodiversity, land use, or distributive effects are at play. The effectiveness of knowledge that can be absorbed and maintained depends on host-country firms, suppliers, and labor markets. The strategic implication is that the success of the technology transfer process is based on the conjunction of a technical solution with the legitimacy of governance, acceptance by stakeholders, and development of capabilities in which the application of ESG practices is directly applicable [2,51,52]. Because technology transfer unfolds through distinct stage-gates with different vulnerabilities, **Table 2** synthesizes how ESG mechanisms operate across the transfer lifecycle and highlights the dominant levers and measurable effects at each stage.

Table 2. ESG mechanisms across the renewable energy technology transfer lifecycle: Stage-specific gates, dominant ESG levers, and expected transfer effects.

Transfer Stage	Key Decision/Gate	Esg Mechanism(s) Most Salient	Expected Transfer Effect	Example Metrics/Data Sources
Partner selection	Partner screening & alignment	Governance compatibility; track record credibility	Higher trust → more collaborative modes (e.g., JV/O&M)	ESG due diligence outputs; audit history; governance red flags
Financing & contracting	Bankability and covenants	Verified safeguards; transparency; stakeholder risk plans	Faster financial close; improved terms; reduced exclusions	Time-to-close; covenants; cost of capital; DFI safeguard compliance
Permitting & siting	Approvals and local acceptance	Community engagement; grievance systems; biodiversity mitigation	Fewer delays; reduced conflict; smoother approvals	Permitting duration; dispute frequency; media/community sentiment
Construction	Safety, quality, subcontractor control	HSE systems; supplier standards; anti-corruption procurement	Lower incident/disruption risk; improved schedule stability	TRIR/LTIFR; rework rates; change orders; audit findings
Commissioning & handover	Knowledge capture & capability embedding	Training systems; documentation routines; governance for O&M	Deeper tacit transfer; higher local readiness	Training completion; competence tests; O&M readiness audits
Operations & replication	Reliability and scaling	Continuous monitoring; transparent reporting; local ecosystem development	Higher availability; reputational capital; repeat projects	Availability factor; downtime; repeat bids won; local supplier share

Note: DFI, Development Finance Institution; HSE, Health, Safety, and Environment; TRIR, Total Recordable Incident Rate; LTIFR, Lost Time Injury Frequency Rate.

3.2. ESG as an Enabler of Partner Selection and Transfer Mode Choice

Cross-border transfer of technology will usually start with the selection of partners and the option of a method of transfer. Such choices are influenced by perceived risk, perceived control, and perceived costs of coordination and monitoring. Governance risks like exposure to corruption, obscured procurement, and uncertain contracting can either scare foreign technological suppliers away in the emerging markets or force them into the limited-engagement approaches, which inhibit knowledge sharing. Perceived hazard can be reduced through strong governance behavior both in the transferring firm and in the potential partners in the host country, as well as the Curative behavior can be enhanced to entangle into more collaborative forms like joint ventures or long-term alliances. Governmental structuring based on transparency, auditability, and ethical procurement practices

can consequently enlarge the conceivable range of transfers and deteriorate the level of knowledge exchanges [53,54].

Credibility and compatibility are other ways in which ESG affects the choice of partners. The transfer of renewable energy often needs convergence in terms of safety, work practices, environmental protection, and stakeholder involvement expectations. Once ESG is institutionalized as a working practice, but not only as an exercise of speech, it turns into a screening mechanism: companies can more readily find partners who are able to comply with international standards and deal with the reputational risk. This is important since renewable projects are very visible and are politically sensitive. Mishaps of partners, like labor breaches, unsafe operations, or community disputes, can quickly turn into project delays, cost increases, or a renegotiation of the contract. Therefore, ESG due diligence is becoming a strategic filter that not only determines with whom one will partner, the governance structure within which the transfer will take place is also being influenced [3].

Simultaneously, ESG may impact the power of negotiations. Companies that are credibly practicing ESG can also discuss bigger amounts of capital, such as blended finance funds and concessional funds, that can enhance their bargaining power and enable them to demand better governance and social protection. On the other hand, transferring firms might choose modes that maintain closer control when neither the host partners nor the host country has ESG capacity, and this spills less, or the host country is less likely to accumulate capability. This dynamic illustrates a fundamental conflict: ESG may either facilitate cooperative transfer through trust building, or it may have a rationale for restrictive arrangements in case ESG gaps are defined as uncontrollable risk.

3.3. ESG and Financing, Risk Mitigation, and Project Bankability

Project finance cannot be separated from technology transfer in renewable energy. The renewable projects are capital-intensive due to the long-life span of the assets, which requires believable cash flow projections and risk-reducing instruments. Currency volatility, offtake creditworthiness, political interference, and regulatory uncertainty risks in emerging markets are compounded by site-specific risks that include land conflicts, environmental approvals, and opposition to the project. ESG has been progressively ingrained in the process of financing due to the influence it has on the likelihood of interference, as well as the reputational risk to financiers.

Regarding the aspect of bankability, ESG is a mechanism of guarantee that project risks are recognized, controlled, and followed by standard procedures. Good governance minimizes fears as regards procurement integrity and contract enforceability. Social protection mechanisms will minimize the chances of delays and expensive renegotiations caused by conflicts. Environmental management systems decrease the exposure to litigation, reduce setbacks, and reduce controversies over biodiversity. They are not just reputational effects. They impact the cost of capital, availability of insurance and guarantees, and availability of long-term debt. ESG may also affect the status of projects to obtain green instruments of financing and the safeguard policy of the development finance institutions [55,56].

Such financing dynamics are important in technology transfer since they determine the selection of technology, suppliers, and organization of knowledge transfer. The financiers might demand standardized reporting, environmental monitoring, or labor compliance audits that must have the capabilities of both foreign and local partners. In case the local partners are able to fulfil these needs, the transfer processes become more scalable and easier. Where they are not able, it is passed on to the technology provider, which could add cost and lower the incentive to embed more locally. In this sense, ESG becomes a language of governance that can be used to align expectations in transnational networks of companies, financiers, and the government.

3.4. ESG in Execution: Quality, Safety, Supply Chains, and Lifecycle Performance

Several technologies in renewable energy are said to be clean due to the nature of their operational emissions profile; however, their implementation has material supply chains, construction hazards, employee exposures, and environmental impact that must be controlled throughout the project life. The transfer of technology is thus based on the ability to carry out complex building and commissioning with sound safety and quality supervision. ESG is not applicable in this case as an ideal, but as a functional discipline [57].

The governance systems affect the execution by controlling procurement, preventing fraud, ensuring documentation,

and ensuring accountability. These mechanisms are important in the new markets where the subcontracting chains may be extended and where purchasing and labor standards might be unequal. The social practices influence the worker training, the safety culture, the grievance systems, and the community communication, which influence the productivity and risk. The environmental practices determine waste management, site restoration, and mitigation of biodiversity and involve the permitting and local acceptance. On its part, institutionalization of ESG in execution routines can help to eliminate rework, accidents, compliance failures, increase schedule performance, and reduce lifecycle costs.

Technology transfer is especially the result of the supply chain dimension. Numerous renewable technologies rely on imported technologies in addition to a local installation and service ecosystem. Supplier standards, associated with ESG, traceability, and labor audits, have the power to build a more reliable supply chain, but can also be expensive and cannot take smaller local suppliers into consideration, unless they can build capacity. In combination with the development and training of suppliers, ESG can speed up the formation of local ecosystems that can keep operations running to facilitate imitation. It can be used as a strict compliance filter without enabling, which makes it dangerous to strengthen the reliance on the foreign supplier and knowledge spillovers [58,59].

Another layer is provided by lifecycle performance. Sustainability of operations and maintenance skills, availability of parts, monitoring systems, and safety measures are required for renewable resources. Transfer of technology, which terminates at commissioning, is not usually adequate to guarantee long-term energy production and stability. The ESG routines, particularly the ones associated with governance accountability, safety, and continuous improvement, are capable of being used to develop the structure of sustaining performance over time. By doing so, ESG will be able to enhance the sustainability of transferred technologies not only in terms of the initial transfer but also in terms of operations.

3.5. ESG and Host-Country Absorptive Capacity: Learning, Localization, and Capability Building

One of the persistently recurring issues when it comes to technology transfer is that the host environment should have the capacity to internalize and adjust the knowledge. The human capital, learning processes in organizations, and the institutional infrastructure underpinning the development of skills and quality assurance determine the absorptive capacity. ESG has the potential to enhance absorptive capacity through formalizing training, enhancing routine governance, and establishing a measurement and accountability culture.

The social investments in the development of the workforce, including training schemes, apprenticeships, and inclusive hiring, are not merely social goods but also useful requirements of technology transfer. There must be technical expertise, safety standards, and operating discipline in the renewable energy systems. In labor markets where such capabilities are not available, the project will depend on too many spillovers from foreign expertise, and its costs will rise. This reliance can be minimized by developing human capital based on ESG, and it opens a channel through which the host market can imitate projects and be innovative locally [60].

Learning is also dependent on practices of governance. Complex documentation, reporting, and standardization are often involved in technology transfer. Companies characterized by good governance can incorporate knowledge capture, impose quality-related standards, and operational routines after the exit of foreign partners. Learning can also be supported through environmental management systems that need monitoring and feedback loops that can be reused in performance optimization processes. Localization as a strategy involves a local grid adaptation of technology to local climate conditions, climatic influences, and maintenance realities. ESG can also be used to facilitate localization through the development of stakeholder feedback mechanisms, community involvement, and risk monitoring mechanisms that can be used to guide adaptive design decisions [61].

Absorptive capacity is not, however, entirely firm-level. It is affected by educational institutions, the vocational training ecosystem, regulatory bodies, and standards organizations. Technology transfer can be further extended beyond the scope of an individual project by the implementation of ESG strategies that will involve these broader institutions by partnering with training centers, certification programs, and local standards development. This wider integration is one of the main channels by which ESG is able to change the one-time transfer of technology by single use into long-term

presence in the market.

3.6. Social License to Operate and the Political Economy of Transfer

The accessibility of land, grid systems, and societal credibility frequently form the basis of renewable energy initiatives. Whether a technically successful initiative is then brought to a halt or pulled, derailed, social conflict, the sense of unfairly sharing the benefits, or distrust in governance processes may occur. Resistance can also be through protest, political mobilization, or informal disruption in emerging markets, which may be experiencing situations where communities have slim recourse opportunities through formal means. The risks can be mitigated through ESG engagement and grievance systems, sharing benefits with the community, and disclosure of information, which enhances procedural fairness and trust.

In the areas where the projects overlap with livelihoods, cultural heritage, or disputed land rights, the strategic role of the social aspect is especially apparent. It is unlikely that people would accept the idea of the community after a single consultation; it might take years of prolonged interaction and other physical advantages like community jobs, infrastructure development, or revenue-sharing. The issue of technology transfer is involved since it affects the local job creation, development of suppliers, and technical competence. Technology transfer projects that neglect local involvement may be seen as extractive or imposed from a foreign extent and may receive more resistance and reduce the long-term sustainability. On the other hand, transfer of technology and plausible social investment have the ability to establish a common ground and reinforce the political backing of imitation [62].

Transparency and governance are also critical since corruption, procurement, and shady deals can attract conflict, which could result in negative outcomes in the purchase of goods or services. ESG-oriented governance will help to minimize such perceptions and enhance the legitimacy of the project and the technology provider. This is not simply a normative assertion; it is a measure of the political economy of infrastructure in the emerging markets, where legitimacy may be the difference between projects being developed, being politically supported or being subjected to negative interventions [62].

3.7. Trade-Offs, Credibility Risks, and Unintended Consequences

Regardless of the potential enablement, ESG may raise tensions that make it difficult to transfer technologies. A single group of trade-offs is associated with speed and cost. Effective protection, reporting processes, and stakeholder involvement procedures have the potential to increase initial expenditure and extend project durations, particularly where hosting institutions are unprepared to fund them. These costs can conflict with the interests of firms that seek substantive ESG in the context of competition in the tender market, as compared to firms that do not, and which internalize the social and environmental costs. This poses a possible adverse selection issue where markets favor lower-cost entrants, at least over the short-term, and this may invalidate the more general argument that ESG is always value-creating [63].

There is a second tension that is connected with distributional politics. Renewable energy is usually discussed as a universally good phenomenon, yet the distribution of the benefits and the burdens of the project is not even. Land and livelihood effects may be suffered by communities when the urban consumers or foreign investors gain. Unless these distributional problems are tackled in ESG frameworks, they can be viewed as shallow and stimulate backlash. This is particularly applicable in the emerging markets where economic disparity and political tussles may be acute.

A third risk is credibility. The signals of ESG can only be effective when they are credible. Greenwashing claims are especially harmful in environmentally friendly energy projects, where the goal is high, and the questions are growing higher. The credibility lapses may affect access to finance, interfere with partnerships, and destroy customer and community trust. Additionally, when ESG is done as reporting outside the actual operations, it may cause a bureaucratic war that takes attention from building capabilities and learning, and thus declines instead of enhancing the effectiveness of technology transfer [64].

Lastly, the local firms and suppliers may be unintentionally disqualified by ESG requirements. High standards of suppliers can favor the long-established international contractors and decrease the chances of local involvement. In the absence of capacity-building interventions, ESG can therefore support dependency and restrict the developmental potential of technology transfer. This brings out the signifi-

cance of considering ESG as a compliance filter and also as a capability-building agenda that should be tailored to local constraints and learning requirements.

The reviewed literature indicates that ESG would influence renewable energy technology transfer in various interrelated ways: it lowers the risks of transactions and disruptions, increases the trust and governance alignment of partners, promotes the absorptive capacity in terms of training and organizational routines, increases access to project bankability and financing, and encourages the social license to operate. These processes are strongest where ESG is institutionalized in the operational practices and where it is in accordance with the local stakeholder priorities and institutional capabilities [2,53].

Meanwhile, the strategic importance of ESG is conditional. In symbolic ESG, where it is inconsistent with local realities, and where it is delivered as both strict compliance without capacity building, it may be more costly, have lower local engagement, and generate credibility risks. What it means is that ESG is not invariably a strategic asset, but it can be turned into one when it is found to enhance the quality and the longevity of technology transfer results consistently and predictably. This transfer-based perspective also preconditions the marketing and commercialization discourse in the following section, since the success of technology transfer determines the brand credibility, customer trust, and legitimacy that determine market access in emerging markets [65,66].

4. Marketing and Commercialization Outcomes of ESG in Emerging Markets

Technical superiority does not spread on its own to renewable energy technologies. They permeate policy-designed and procurement system-designed markets, which have financing limits and are socially legitimate. These market-shaping forces are more visible and more powerful in emerging markets than in mature economies due to the fact that the institutional terrain of energy transition remains unshaded. Consequently, commercialization cannot be separated, and stakeholder management, reputation, and marketing are often not limited to customer persuasion, but also to legitimacy-building by regulators, financiers, communities, and intermediaries. In such a setting, ESG has the potential to serve as a strategic resource, decreasing perceived risk, enhancing trust, and distinguishing firms both in the market and nonmarket arenas. Nevertheless, ESG may, too, fail to bring about commercial value when they are poorly communicated, lacks credibility, or are not aligned with the real priorities of the stakeholders in a particular context [67].

The paper under discussion evaluates the impact of ESG on market access, adoption, and competition positioning of renewable energy technologies in emerging markets. It highlights that ESG has a variety of channels through which it influences marketing performance: signaling and credibility, procurement and compliance preparedness, ecosystem and channeling growth, and development of narratives that relate technology implementation to locally salient development results. It also sheds light on constraints and opposing forces, especially the issue of greenwashing, the risk of oversensitization, and the likelihood of the emergence of ESG as an expensive and unfunded demand.

4.1. The Market Structure of Renewable Energy Commercialization in Emerging Markets

The concept of marketing in renewable energy is misconstrued when it is compared with the marketing of consumer goods. The institutional market forms the core market in most of the emerging markets. Utility-scale projects are the ones that are generally granted by a competitive tender procedure, a bilateral negotiation procedure, or through a public-private partnership. Even distributed energy systems often rely on intermediaries (including microfinance institutions, telecom solutions, local installers, and programs funded by donors). As a result of this form of commercialization, qualification, credibility, and the capacity to coordinate intricate stakeholder ecosystems are the crucial factors to consider rather than mass advertising.

This is the type of market structure that defines the ESG. ESG will determine the qualification to take part in tenders, the basis on which bids are evaluated, and risk perception to those who underwrite projects by financiers. It also has an impact on relations with local authorities and communities that pre-determine the possible access to and the stability of the market access indirectly. Essentially, in this respect, ESG is incorporated in the market making and not in the market competing. Companies that are capable

of exhibiting strong levels of governance, plausible social protection, and environmental custodianship tend to be less hindered by accessibility in controlled procurement settings and also better placed to bargain with political actors who are reluctant to legitimize and pose a political danger [68,69].

Simultaneously, new markets are often characterized by a hybrid market, where formal procurement rules go hand in hand with informal networks, political connections, and trust-driven relations. This complicates ESG's role. In high-procurement integrity, ESG may work as a transparent differentiator. Where integrity is lacking, ESG still may be important, but in indirect ways like reputational insurance, provision of development finance, and choice of partners instead of formal scoring systems on their own. This duality explains why an ESG-oriented marketing plan cannot be uniform and should be based on the notion of the allocation of value in specific energy markets.

4.2. ESG as a Market Signal: Reducing Perceived Risk and Building Trust

In developing economies, information asymmetry is a focal commercialization limitation. Buyers, regulators, and financiers usually can do very little to check the reliability of new technologies in terms of their operational functioning, the integrity of suppliers, or the maintenance capacity of the project developers in long-term care. As well, renewable energy resources bind stakeholders to long-term contracts; a non-successful project has the potential to cost several decades. In this case, ESG can act as a credible signal to decrease perceived risk [70].

In all cases, the institutional stakeholders are on the lookout for the most immediate signal, which is governance performance, as it addresses the questions of contract reliability, procurement integrity, and accountability. Social performance is an indicator of the capability to deal with workforce safety, community relationships, and political sensitivity. Environmental performance is an indicator of regulatory compliance preparedness and long-term stewardship, such as biodiversity management regulation and, over time, lifecycle management, including waste and end-of-life management. Combined, these signals enable the stakeholders to determine the ability of a firm to provide predictable results in uncertain environments.

The effect of the signaling is enhanced when ESG claims are backed by third-party verification, regular disclosure, and visible project performance. Instead, signaling fails in the case of inconsistent disclosure, poor data quality, and generic and unrealistic claims. In innovative markets, the skepticism can be particularly high since the stakeholders might have been victims in the past when a similar project was carried out that promised to bring a local benefit but ended up bringing very little of it. Consequently, the commercial worth of ESG is not in the amount of a message but in the infrastructure of credibility pertaining to that message, such as measurement, confirmation, and action in response to the stakeholder interests [71].

4.3. ESG and Market Access through Procurement, Compliance, and Financing

Procurement is another major market penetration path in renewable energy, and ESG is becoming an influential factor in procurement access. There are numerous tender bids and concession procedures that contain the aspects of environmental impact management, employment standards, community consultation, and transparency in governance. Although ESG is not always explicitly mentioned as a scoring category, it usually appears in the qualification thresholds, allowing timelines, or the ease of the public authorities towards specific partners. Companies that can show developed systems of ESG may thus have an easier entry and quicker transition in the regulatory and due diligence process [72].

An equivalent channel is financing. Development finance institutions, export credit agencies, and blended finance mechanisms that entrench policies to protect against risks, and policies that tie ESG-related covenants into the deal structure are highly influential on the growth of renewable energy in emerging markets. ESG preparedness is capable of decreasing the friction in due diligence, decreasing the risk of financing delays, and increasing the availability of risk mitigation tools. These impacts may translate into measurable commercial benefits: reduced cost of capital will enhance the competitiveness of the bid; expedience of financial close will enhance the implementation of the project; and more robust risk profiles will enhance scaling, which can be achieved by developing a portfolio. By so doing, ESG is turned into a commercialization asset as it not only influences perceptions but also influences the economics of market entry [69,73].

Nonetheless, there are ESG-related procurement and fi-

nancing strategies that may cause a strategic dilemma. Compliance can be expensive, especially to companies aiming to localize supply chains or form relationships with other smaller domestic companies not have ESG capabilities. Companies will thus have to make a tradeoff between tough ESG demands and practical ability development in their ecosystems. The fact is that such a balance can also become a differentiator when it is properly implemented: companies can present themselves as the reliable partners that can bring both results and development. Once done in the wrong way, it may act as a bottleneck that compromises competitiveness. Commercialization in emerging markets is mediated by multiple stakeholder 'customers' beyond end users; **Table 3** maps how ESG-based evidence affects stakeholder decisions and translates into market access, adoption, and scaling outcomes.

Table 3. ESG-to-commercialization pathways in emerging markets: Stakeholder decision levers, credible ESG evidence, and commercialization outcomes.

Stakeholder "Customer"	Primary Decision Lever	What ESG Must Demonstrate	Evidence That Is Persuasive	Commercialization Outcome Most Affected
Public procurers/Regulators	Eligibility and political acceptability	Governance integrity; compliance readiness; social safeguards	Prequalification docs; verified audits; transparent procurement	Tender access; permitting speed; contract award probability
Development finance/Insurers	Bankability and downside risk	Safeguard adherence; monitoring; grievance responsiveness	Third-party verification; covenants; impact monitoring	Cost of capital; tenor; guarantees; time-to-close
Utilities/Corporate offtakers	Reliability and reputational risk	Lifecycle performance; O&M capability; credible reporting	Performance guarantees; verified KPIs; service ecosystem proof	Contract award; pricing power; renewals/repeat contracts
Local communities	Fairness and benefit distribution	Tangible co-benefits; voice and remedy mechanisms	Benefit-sharing terms; jobs/training evidence; grievance closure	Social license; disruption risk; long-run stability
Local suppliers/Installers	Capability and inclusion	Supplier development; standards transfer; fair contracting	Training/certification programs; transparent onboarding	Channel strength; localization; scalability

Note: KPIs, Key Performance Indicators.

4.4. ESG as Value Proposition: Differentiation beyond Price in Adoption Decisions

Because renewable commercialization is ecosystem-based and gatekeeper-driven in many emerging markets, **Figure 2** maps the stakeholder decision points through which ESG evidence translates into eligibility, bankability, adoption, and repeat procurement success. Price and reliability are usually central in renewable energy markets in emerging markets, where buyers are usually constrained. Perceived risk, reputational exposure, and political acceptability are also included in the adoption decisions. ESG may help in differentiation by adding to the perceived value of a renewable solution beyond kilowatt-hours or even equipment specifications. To institutional purchasers, ESG has the potential to decrease reputational risk, enhance confidence in compliance, and indicate resilience. ESG-aligned suppliers can be the solution to satisfying reporting goals and stakeholder expectations of corporate buyers seeking decarbonization objectives. To communities and local governments, ESG can relate renewable deployments to jobs, local infrastructure, and social co-benefits that define approval [74,75].

The marketing issue is that local legibility of ESG value propositions needs to be employed. Social indicators of local job opportunities, skills training, and affordability can be more important in certain situations than the abstract emissions. In some other cases, issues of transparency and anti-corruption in governance might take the lead. The environmental priorities can also be different, e.g., climate mitigation goals and biodiversity or water-use issues. Companies that consider ESG a generic message run the risk of communicating in a manner that does not resonate and can even cause some level of mistrust. Good ESG-based differentiation thus involves the conversion of ESG into the precise results that the stakeholders within a certain market recognize as beneficial and reputable.

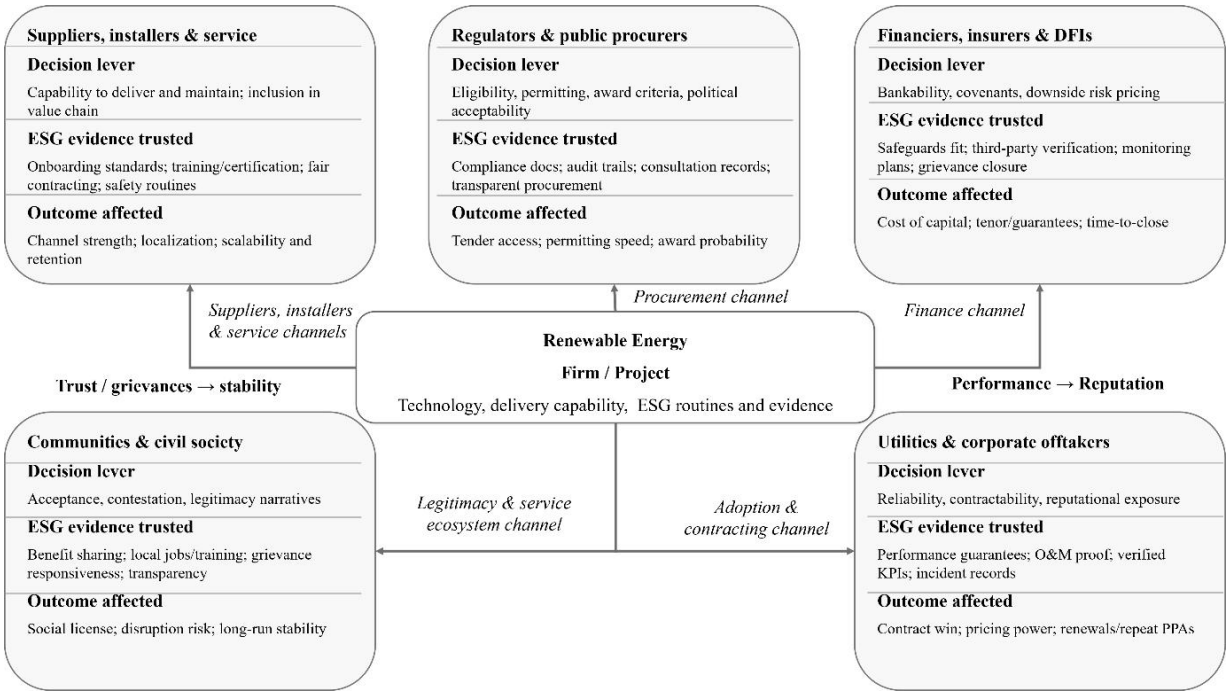

Figure 2. Stakeholder-based commercialization map in emerging markets: ESG signals, decision levers, and market formation channels.

The features of technology are also connected with this translation. Distributed solutions like solar home systems can be promoted with the help of energy access, household resilience, and local entrepreneurship narratives, whereas utility-scale projects may focus on grid stability, industrial development, and energy security in the country. These narratives can be integrated with ESG, but they should be tied to actual practices, like the training programs, effects of the transparent tariffs, or communal benefit bargains [76].

4.5. Ecosystem and Channel Strategy: Stakeholder Marketing in Multi-Actor Markets

Ecosystem building in emerging markets may be necessary because of commercialization. The developers of renewable energy should develop relationships with the policymakers, grid operators, financiers, installers, suppliers, and community organizations. Marketing in these ecosystems is more about expectation coordination and less unidirectional persuasion, and uncertainty reduction among the actors that are interdependent. ESG may act as a common language and a harmonizing mechanism in these relationships [77].

Governance structures facilitate the creation of coordination by enhancing accountability and information circulation, and minimizing the tension that typically weakens partnerships. Social structures help in facilitating cooperation through the creation of engagement practices, governing systems, and benefit sharing, which minimizes the chances of conflicts. Environmental frameworks enable the process of coordination by making impact assessments, mitigation strategies, and monitoring processes standardized to appeal to regulators and financiers. ESG incorporated into ecosystem strategy might hasten the process of partner onboarding, enhance the stability of a distribution and service channel, and generate reputational spillovers that draw more partners [78].

This is more so in the after-sales service and long-term operation of renewable technologies. Weak ecosystems in terms of maintenance can ruin the performance and destroy brand credibility. Companies investing in ESG-congruent human resources and safety culture, as well as supplier capability on the local level, will be able to reinforce channel performance and generate reputational advantage based on reliability. In this regard, ESG is used to enhance commercialization through bettering the back-office system of the service that aids in adoption and retention.

4.6. ESG Communication: Credibility, Localization, and the Risk of Greenwashing

The profits of commercialization of ESG are dependent on the strategy of communication, but it is here that

ESG can flop most obviously. Stakeholders of emerging markets can understand ESG claims in terms of past experiences of extractive projects, promises that have not been kept, and foreign corporations as distant, unconnected to local demands. Canned ESG messages or foreign stories can thus work against them. Communication about ESG must be contextualized, specific, and must be consistent with what the stakeholders can see.

Increased credibility comes along with firms communicating not just goals, but also the processes and outcomes, including failures and mitigation measures. Being frank about trade-offs would be more convincing than the smooth stories that do not seem real. Skepticism can also be minimized with the help of third-party validation, feedback from the community, and the use of unchanging metrics over time. Notably, credibility is relative; it is established by repeated exchanges, by responsiveness to complaints, by a sense of fair play in the decision-making, not by reports alone. The risk of greenwashing is high in renewable energy since the stakeholders tend to believe that renewable energy is automatically sustainable. This may cause companies to emphasize environmental gains at the expense of under-emphasizing social and governance issues (land disputes, labor standards, or purchase transparency). Controversies can eliminate the credibility of a single firm as well as affect more general trust in renewable transitions. Therefore, ESG communication should be incorporated into operational practice and should be considered as one of the strategic functions related to risk governance, but not as a promotional feature [76].

It is also necessary to localize. The ESG language, as constructed in the world of finance and reporting systems, might fail to align with the local interests of stakeholders or cultural frames. Marketing can make ESG concrete and local, and show how local benefits are transferred and quantified. There must be local alliances and awareness of the social situation in this translation, especially where renewable implementation overlaps land ownership, community, or distributive politics.

4.7. Measuring Commercial Outcomes: From Reputation to Adoption and Retention

The fact that commercial results are measured in an inconsistent way is one of the reasons why academic understanding of the marketing value of ESG has been rather disjointed. In renewable energy, the success in commercial terms may involve the tender award, the expansion of the pipeline, the replication of the project, benefits in costs of capital, or the provision of better contract conditions. It may also manifest as a decreasing project delay, fewer disputes, and more customer retention in distributed markets. These are the results influenced by market performance and non-market legitimacy.

Reputation is commonly considered as a middle ground production joining ESG with commercial worth. At the same time, reputation is multi-dimensional: it may include the image of technical reliability, moral integrity, social responsibility, and environmental care. Reputational politics in emerging markets tend to become localized and networked by proliferating through government agencies, financiers, community groups, and contractor ecosystems. These dynamics have to be measured by integrating both market indicators and nonmarket indicators, which will include allowing speed, the feeling of the community, the media coverage, and the trust of stakeholders [79].

The adoption of customers is also segmented. The adoption process of utility-scale is mediated by the procurement systems and regulation, whereas the distributed adoption is mediated by the affordability, financing, and the quality of the servicing. The contribution of ESG might thus vary across the segments. Indicatively, governance and compliance readiness might be a determining factor to institutional buyers, whereas social outcomes and local service ecosystems might be more important to household adoption. Commercialization-focused perception of ESG needs to therefore consider the marketing consequences as a set of mechanisms and measurements as opposed to a single performance indicator [80].

According to the literature, ESG affects commercialization in emerging markets through the construction of trust, perceived risk reduction, greater access to procurement and financing, coordination of an ecosystem, and differentiation by locating salient value propositions. The most powerful effects happen in the situation where ESG has an operational basis, provability, and conversion to market-relevant outcomes. ESG is commercially essential when it enhances the likelihood of market penetration and project survival, minimizes the cost of capital, and enhances the integrity and authenticity that lead to reiteration of business and expan-

sion [2].

Simultaneously, ESG is not a marketing benefit per se. In markets that are price-sensitive, the stakeholders are unlikely to reward ESG per se without associating it with the tangible results, like reliability, affordability, and co-benefits of development. Excessively standardized ESG communication may not find the mark, and a lack of credibility may result in reputational harm that demeans market and non-market positioning. The strategic dilemma of the companies then lies in the need to incorporate ESG into commercialization in a manner that is locally plausible and operationally consistent and in line with the institutional channels through which renewable energy markets are being built. This synthesis preconditions the case study analysis in the following section, where the mechanisms of the review are explained by showing the empirical patterns of the technology transfer and market entry in an emerging market situation [3].

5. Case Study Synthesis: Renewable Energy Technology Transfer and Marketing: China and Germany

Sections 3 and 4 were that ESG is a strategic resource in the new markets when it is a performance capacity and a reputation marker throughout the entire technology transfer and commercialization cycle. In order to render these mechanisms tangible, this section is the synthesis of two instructive country cases: outward renewable energy technology transfer and market formation of Chinese firms and financiers, and the outward renewable energy technology transfer of German firms and institutions. This is not to assert that either of the two cases is internally homogeneous, namely that they are both heterogeneous ecosystems, but instead to leverage the contrast to elucidate how ESG is interplaying with transfer mechanisms, financing structures, stakeholder participation practices, and marketing channels in new market contexts [81–84].

5.1. Why China and Germany Are Informative Comparative Cases

Emerging markets could be best analyzed through a case-based lens due to the fact that the same technology can be transferred, financed, localized, and legitimized to yield varying results. China and Germany are two powerful, globally visible examples of the possibility of developing both renewable energy and gaining the ability to reach out. China is intimately linked with rapid scaling up in solar and wind equipment manufacturing, price-driven implementation, and the ability to package projects and frequently include equipment, engineering, and financing. Germany has been linked to engineering-based value propositions, a culture of high standardization and compliance, outward orientation, which often focuses on protecting, capacity building, and institutional fortification, as well as technology supply. The comparison of these patterns assists in determining how the ESG may be integrated variably into the strategic assets, such as trust in your partners, bankability, and brand credibility [85,86].

The section, hence, follows a similar line of analysis: which are the prevailing transfer modes and actors; how ESG is imported into partner selection and governance; how finance and mitigation of risk affect the depth of transfers; and how does the marketing implication in tender-driven and stakeholder-driven emerging market environments?

5.2. Case A: Chinese Renewable Technology Transfer and Market Entry in Emerging Markets

The participation in the Chinese renewable energy market has been typified in most emerging markets with the capacity to perform at scale, speed, and at a cost advantage. This trend can be substantiated by an industrial ecosystem of significant scale in terms of high equipment, engineering, and construction contractors, and state-linked or policy-supported financial participants, including the China Development Bank and the Export-Import Bank of China. Practically, what results is a transfer bundle that may not just comprise hardware, e.g., modules and inverters, and turbines or grid apparatus, but also engineering design, construction management, and, in other cases, operational support. These characteristics have been inclined to the favorable effects of transfer arrangements that compress timelines, complex transactions of host governments, and facilitate the fast addition of renewable capacity [87].

In this case, project governance and stakeholder risk tend to mediate the ESG transfer link and not necessarily ESG branding itself. In host markets that value speed, af-

fordability, and capacity building, the governance ability that provides reliability in delivery may serve as an ESG-adjacent strategic resource even where that is not identified as such. Nonetheless, since the renewable projects are connected to the land use politics, labor terms, and community expectations, the social and governance aspects can prove decisive in case the project faces contest. In this respect, the strategic value of ESG lies in the ability of contractors and developers to have strong practices of stakeholder engagement, grievance management, labor management, and procurement integrity, which minimizes disruption risk and secures bankability[88].

Another aspect of Chinese outward renewable involvement is that it is common to have a significant focus on financing architecture in facilitating transfer. Coupling equipment supply and delivery with concessional or structured finance changes the commercialization route variant to increasingly competitive tendering to a more comprehensive political economy of deal-making where bankability, perception of sovereign risk, and the relationship between governments will influence results. This may generate both strengths and weaknesses in the aspect of ESG. The benefit is that it is the bundle that opens projects that otherwise may come to a halt when it comes to financing or risk aversion by commercial lenders. The weakness is that projects may be subjected to increased scrutiny in terms of transparency, debt sustainability stories, distribution of local benefits, and environmental and social protection, especially when the various stakeholders, including the public agencies, communities, and international financiers, have different expectations[89].

In this instance, marketing results are usually associated with the credibility of execution and the performance of the lifecycle. With tender-driven markets, the initial wins can be based on cost competitiveness, but repeat business and scaling may require delivered assets to be reliable and the developers to have legitimacy with regulators and communities. Consequently, ESG will act as a strategic asset best operationalized when applied as performance assurance: safety systems that minimize incidents, governance systems that minimize disputes, and social routines that maintain community acceptance. That is, the market-facing value of ESG is often achieved indirectly by sufficiency and less conflict, as opposed to being directly achieved by consumer-based ESG communications.

5.3. Case B: German Renewable Technology Transfer and Market Entry in Emerging Markets

High standards, quality assurance, and institutionalized risk management are often viewed as the characteristics of German outward renewable activity, and they make sense within the framework of German industrial tradition in which compliance, documentation, and certification are intimately linked with engineering practice. In the emerging markets, this is usually translated into transfer arrangements whereby the provision of technology comes hand in hand with organized training, standardization of processes, and capacity building. The enabling environment is often influenced by German development institutions like Kreditanstalt für Wiederaufbau (KfW) and finance institutions like Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), as well as technical cooperation actors like GIZ, by providing project preparation support, protection, and building market institutions. The importance of this institutional layer is that it determines the environment in which technology transfer can be maintained, such as regulatory ability, grid integration planning, and workforce development ecosystems[90–92].

In this instance, ESG may tend to be more clearly incorporated in transfer governance. The safeguards, transparency, and social and environmental risk management are more likely to be a focus of partner selection and due diligence as conditions to be a bankable company and reputation protection. Such requirements may both add initial transaction costs and extend the time to prepare, and they may also alleviate downstream disruption and enhance the long-run viability of the project. In places where the emerging markets are finding it challenging to allow or tolerate uncertainty, community contestation, or their limited capacity to enforce, ESG-based governance practices are tactical since they can stabilize what all financiers, regulators, and local stakeholders expect.

The unique aspect here is that standards and verification play a significant part in developing transfer depth and marketing credibility. The German-related projects tend to focus on documentation, monitoring, and performance verification that may enhance the signaling role of ESG. To institutional buyers, which include utilities, government agencies, and corporate offtakes, such verification decreases the information asymmetry and may enhance the willingness to sign

long-term contracts. Credibility infrastructure marketing in this model is thus directly related to standardized reporting, third-party verification, and a story of reliability and responsible delivery that is backed by some measures [93].

Meanwhile, the German model will be limited by commercialization in cost-conscious markets. When ESG protections are introduced as strict compliance without flexible local capacity building, they will be able to disfavor smaller local suppliers or sluggish delivery in ways that will make them less competitive in auctions where price matters significantly. The strategic teaching point is that when ESG is combined with the mechanisms of developing local capability (training pipelines, developing suppliers, and institutional strengthening), it will create an advantage, but not when it is used as a filtering mechanism, mainly as a gatekeeping mechanism.

5.4. Comparative Mechanisms: Two Pathways Linking ESG, Transfer, and Marketing

The comparison of the two cases makes it clear that ESG turns into a strategic asset, but in various but partially overlapping ways. One pathway is the execution-centred one. ESG generates value in environments where speed, scale, and cost are decisive by increasing the reliability of projects and minimizing the risk of disruption. This route is best observed in the case where the governance and social practices are incorporated in delivery systems, such as procurement integrity, safety culture, and stakeholder engagement, where performance credibility builds on projects and enhances future market accessibility.

The second approach is institution and verification-based. ESG can produce value in the environment where bankability and legitimacy constraints prevail, especially in an environment where various financiers, regulators, and civil society participants subject projects to scrutiny. This route reinforces tender eligibility, due diligence, and facilitates marketing assertions of accountability and dependability in a manner that can be deciphered by institutional purchasers and worldwide capital suppliers [6].

Another similarity is also exposed in the opposition: ESG becomes de-strategic when it is no longer linked to local fit. In either of the two instances, the collapse of generic ESG discourse may occur when communities feel that they are not getting equal benefits, when the benefits of local employment and suppliers are not felt, or when they believe that governance is opaque. On the other hand, ESG is being strategically strong when it is converted to local outcomes, which are visible, such as skills transfer, safer work sites, reliable power delivery, fair resolution of grievances, and the measurement and communication of these outcomes in ways that appeal to local stakeholders as well as global financiers [94–96]. To make the cross-case logic transparent, **Table 4** summarizes the stylized China- and Germany-associated pathways, emphasizing how ESG creates value through distinct execution- and verification-centered mechanisms and how these mechanisms condition commercialization.

Table 4. Comparative case synthesis of China and Germany: Outward renewable technology transfer and commercialization pathways and their ESG implications for emerging markets.

Dimension	China-Associated Outward Pathway (Stylized)	Germany-Associated Outward Pathway (Stylized)	Implication for Emerging-Market Hosts
Typical value proposition	Speed, scale, cost competitiveness, bundled delivery	Quality, standards, safeguards, verification-driven credibility	Choose based on binding constraint: affordability/speed vs. bankability/legitimacy
Common transfer packaging	Equipment + EPC; sometimes bundled finance	Technology + structured training + institutional support (often alongside finance)	Packaging shapes spillovers: hardware-only vs. capability-embedded transfer
ESG emphasis in practice	Often execution-centered (reliability, disruption reduction)	Often verification-centered (standards, safeguards, disclosure)	Best outcomes when both are combined and locally adapted
Commercialization pathway	Competitive bids + deal structuring via finance/relationships	Procurement eligibility + credibility with financiers/institutional buyers	Market structure determines which ESG "channel" matters most
Key strengths	Rapid deployment; supply chain scale; price advantage	Lower perceived risk; smoother due diligence; stronger signaling	Hybrid strategies can exploit strengths while mitigating weaknesses

Table 4. *Cont.*

Dimension	China-Associated Outward Pathway (Stylized)	Germany-Associated Outward Pathway (Stylized)	Implication for Emerging-Market Hosts
Key vulnerabilities	Scrutiny around transparency, distributional impacts, community conflicts	Higher transaction costs; slower timelines; potential supplier exclusion	Pair safeguards with local capacity building to avoid backlash/exclusion
What "ESG as asset" looks like	Operational discipline → reliability → repeat wins	Verified safeguards → bankability → tender access	ESG must translate into measurable outcomes and local legitimacy

5.5. Implications for Transfer Mode Choice and Capability Spillovers

Figure 3 contrasts the China- and Germany-associated outward engagement archetypes and highlights a convergence zone in which execution reliability, verified safeguards, and local capability building jointly enhance transfer depth and commercialization. The two cases portray the interaction of ESG with transfer mode choice as well as learning spillovers. When the compatibility of governance trust and safeguard is high, additional modes of collaboration transfer will become possible so that more tacit knowledge is exchanged and greater local capability is embedded. In places with a lower degree of trust or unequal capacity to execute ESG, transfer arrangements are more likely to be highly control-oriented, which can help hasten the deployment, but it might restrict the spillovers into the local supplier ecosystems and their long-term operational capabilities.

On the side of emerging markets, technology does not come, but whether it comes with knowledge, routines, and ecosystem development that is required to sustain performance and replication. This result can be facilitated by a well-presented ESG as an agenda of capability building that encompasses training of the workforce, safety and quality procedures, and supplier development, irrespective of the original motivation of cost competitiveness or safeguard compliance [97].

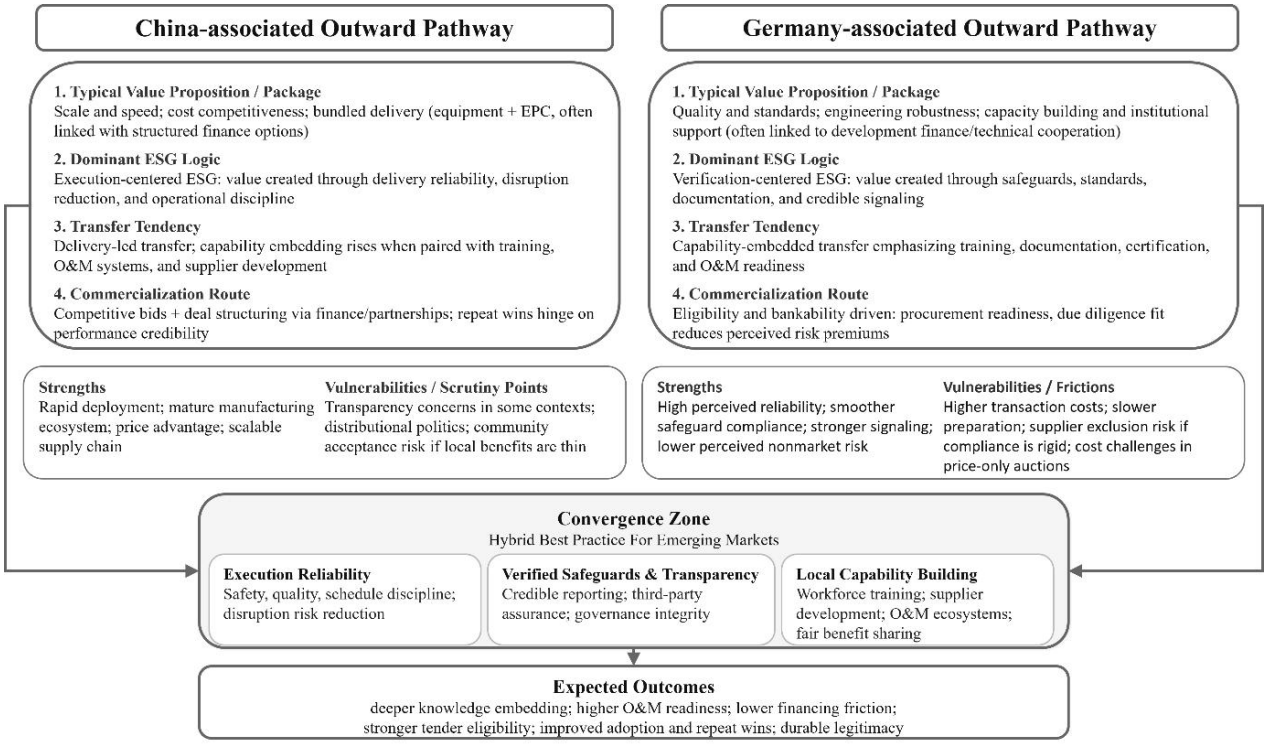

Figure 3. China-Germany comparative pathway model: Execution-centered versus verification-centered ESG mechanisms and their commercialization implications in emerging markets.

5.6. Propositions Emerging from the China-Germany Synthesis

The comparative synthesis is in support of a series of empirically testable propositions, which relate ESG to empirically measurable technology transfer and marketing results. One suggestion is that ESG maturity enhances the possibility of high-collaboration transfer modes through a diminution in governance and stakeholder risks, thus raising the tacit knowledge transfer and the formation of local capabilities. The second hypothesis is that ESG commercial value in the emerging markets is facilitated by the credibility of the execution: ESG is most likely to raise the tender success and scaling when it enhances reliability, mitigates the project delays, and improves the trust of the stakeholders. The third hypothesis is that the strength of verification moderates the signaling strength of ESG: in the presence of credible and salient third-party verification and standardized reporting, ESG will be more deeply carried through into lower financing frictions and better market access [47,98,99].

One of the last propositions is on local fit. Those ESG strategies enticing safeguards with a premeditated local capacity building, training mechanisms, supplier modernization, and transparent benefit-sharing are more prone to produce sustainable legitimacy and repeat commercialization achievement than those providing low-cost delivery without stakeholder integrations or high-compliance gatekeeping without ecosystem development. Collectively, the China and Germany case studies support the main argument of the review, which is that ESG becomes a strategic resource in new markets when it is not a peripheral form of message but a capacity of operation and relationship manipulation, which determines how renewable technologies are distributed, funded, justified, and eventually mainstreamed [24,65].

6. Conclusions

This review has gone further to support the contention that ESG can be used as a strategic asset in emerging markets, provided it is operationalized as a capability enhancing the transfer of renewable energy technology and enhancing commercialization performance. Instead of viewing ESG as an external compliance cost or a reputation-enhancing tool, the article has collated the evidence on strategic management, institutional theory, stakeholder governance, signaling, and technology transfer literature to demonstrate how ESG becomes valuable due to the tangible processes: it decreases transaction and disruption risk, increases partner trust and governance fit, increases absorptive capacity through workforce and process development, and increases market access by decreasing financing frictions and enhancing procurement eligibility. Through these channels, however, the key understanding here is that ESG generates value in the most consistent way when it is institutionalized in the manner of how projects are governed, actually delivered, and maintained, thus transforming sustainability assertions into quantifiable performance and credibility.

One of the contributions made by the review is that it combines the viewpoints of technology transfer and marketing. Most of the time, technology transfer is talked about as an issue of equipment movement, licensing, or investment, and marketing is an issue of messaging or persuasion of the stakeholders. These areas cannot be separated in an emerging market renewable energy transition. The quality of execution, acceptance of the community, and the overall performance of the operations in the long run determine the credibility of the ESG-based market positioning; so does the quality of the ability to execute and impart knowledge at a depth, which is predetermined by the market access conditions, financing needs, and legitimacy constraints put in place by the regulators and local stakeholders. The article thus transforms ESG into a connection between the ability to operate and the ability to make markets: it connects the way in which renewable energy projects are to be delivered with the way in which they are being funded, managed, adopted, and expanded.

The comparative case synthesis of China and Germany further explains that the strategic value of ESG is not obtained with reference to one optimal model, but with coherence of ESG activities and the institutional and market channels by which renewable energy is implemented. The China-related route suggests the importance of scale, velocity and the bundling delivery as a source of rapid diffusion but also the role of the credibility of governance and social license as determinants where the project is subjected to increased scrutiny or is challenged by the stakeholders. Germany-linked pathway demonstrates how the information asymmetry can be minimized through the use of safeguards, standards, and verification, and how the legitimacy of the

company and institutional buyers can be enhanced, and how the risk of stagnation in the process of delivery or blocking of the local partners in the absence of adequate capacity building can be identified. Combined with the cases, the cases would indicate that ESG is a strategic resource that works in two complementary logics, namely an implementation-based logic that generates value based on reliability and reduction of disruption, and a verification-based logic that generates value based on bankability, legitimacy, and credible signaling. The sustainability of benefit in both logics relies on the local fit and on whether ESG is converted into results that can be measured and verified by the stakeholders.

This has many implications for managers, policymakers, and financiers. As a strategic activity of firms, it is a strategic task to use ESG as a project operating system rather than a reporting tier. Governance systems that guarantee integrity and accountability of procurement, social systems that create workforce competence and grievance management, and environmental routines that enable permitting and lifecycle custodianship are not just ethical protective systems but also competitive facilitators in circumstances where uncertainty and contestation can destroy otherwise feasible undertakings. Commercialization based on ESG demands two-way communication, standard reporting, and control that would meet the requirements of international capital and institutional purchasers, along with localization in terms of meaningful and localized narratives based on tangible benefits like skills transfer, local supplier development, equitable engagement, and trusted service. The findings for policymakers and development finance institutions can be applied in the following manner: to ensure that capability building is supported and not exclusionary compliance, it is important to align incentives to ensure that ESG is applied. Market structures that reward sustainability, open procurement, and plausible benefit sharing can assist in ensuring that ESG is leveraged as a source of sustainability and industrial learning.

Several perennial challenges that influence future research are also pointed out in the review. First, the measurement of ESG is still biased, and the boundary between symbolic disclosure and substantive ability still needs a better operationalization in empirical research. Second, many of the ESG performance assertions are causally ambiguous; they require more longitudinal studies and quasi-experimental designs to understand when the bankability of ESG, or the delays, operational performance, or customer adoption, is driven by ESG. A persistent limitation in the literature reviewed is the near-exclusive reliance on correlational designs that cannot rule out reverse causality (e.g., high-performing firms adopt ESG as a signaling complement rather than ESG driving performance) or unobserved confounding (e.g., managerial quality driving both ESG adoption and transfer success). Future research should prioritize quasi-experimental approaches, such as difference-in-differences exploiting regulatory shocks or ESG mandate introductions, instrumental variable designs leveraging exogenous variation in stakeholder pressure or disclosure requirements, and regression discontinuity designs where ESG rating thresholds determine financing eligibility, to isolate whether ESG maturity causally enhances partner selection, absorptive capacity, bankability, and market access. Without such identification strategies, the strategic asset claim remains theoretically plausible but empirically underdetermined.

Third, emerging markets are not homogeneous, and future work must define the boundary conditions in finer detail, such as the role of policy stability, procurement integrity, stakeholder organization, and technology complexity. Lastly, the renewable transition brings distributional concerns, which are typically not well incorporated into firm-level ESG models, such as affordability, land rights, local involvement, and the results of a just transition. These issues, which must be resolved, are crucial to the ethical legitimacy as well as the strategic sustainability of large-scale deployment of renewables.

Overall, the key takeaway of the article is that ESG will be the most beneficial in the process of renewable energy transitions in the emerging markets when viewed as a strategic capability that enhances the depth of technology transfer, operational reliability, and the development of credible legitimacy with the local stakeholders and global capital. ESG is an asset when it allows firms to provide renewable projects, which are not only low-carbon but also institutionally viable, socially accepted, and commercially scalable.

Funding

This work received no external funding.

Institutional Review Board Statement

Not applicable.

Informed Consent Statement

Not applicable.

Data Availability Statement

All the data is presented in the article.

Conflicts of Interest

The author declares no conflict of interest.

AI Use Statement

The author declares that no artificial intelligence (AI) tools were used in the preparation of this manuscript.

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