

A Multi Theoretical Model of Dynamic Competitiveness in Indonesia's Renewable Energy Ecosystem

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Abstract - Indonesia's transition to renewable energy is critical for achieving national development targets and global climate commitments. However, competitiveness in this sector is shaped not only by cost and technology, but also by how firms and ecosystems navigate regulatory complexity, innovation imperatives, and multi-actor collaboration. This study proposes a conceptual model of dynamic competitiveness in Indonesia's renewable energy sector by integrating three strategic theories: the Value Creation Model, the Sharing Economy Framework, and the Resource-Based View (RBV). Drawing on a synthesis of 27 academic and policy sources, the model identifies four strategic antecedents—innovation strategy, platform integration, community engagement, and policy alignment—that influence competitiveness through three mediating mechanisms: value creation positioning, participatory energy models, and strategic resource deployment. The model conceptualizes renewable energy competitiveness as the central outcome and highlights its practical manifestations in the form of technology adoption, expanded energy access, and an inclusive energy transition. This study offers a theory-driven, context-specific framework for analyzing competitive advantage in energy transitions. The model provides a strategic lens for renewable energy firms, investors, and policymakers to assess competitive positioning, ecosystem readiness, and the pathways toward socially inclusive and resilient clean energy systems

Keywords - Dynamic Competitiveness; Renewable Energy; Value Creation; Sharing Economy

I. Introduction

Background

The global energy sector is undergoing a profound transformation driven by decarbonization, decentralization, and digitalization. For emerging economies like Indonesia, this shift is not only an environmental imperative but also a strategic opportunity to reshape industrial competitiveness, social equity, and long-term economic resilience. With commitments to reach 23% renewable energy (RE) in the national energy mix by 2025 and achieve net zero emissions by 2060, Indonesia faces both systemic constraints and strategic openings (PT PLN, 2021; IRENA, 2017).

Despite having significant renewable potential—more than 330 GW across solar, wind, and hydro resources (IESR, 2025)—Indonesia's RE adoption has been slow due to fragmented governance, regulatory uncertainty, and limited institutional capacity (Climate Transparency, 2024; McKinsey & Company, 2024). The need for competitiveness in the renewable energy sector is not just technological or economic; it is deeply tied to strategic positioning, resource mobilization, and ecosystem collaboration (Sumarsono et al., 2022). This makes the Indonesian RE landscape a compelling site to examine the dynamics of competitiveness under structural, institutional, and market constraints.

Conventional approaches to competitiveness—especially in the energy sector—often center on cost leadership or policy frameworks. However, these are increasingly insufficient to capture the realities of an energy ecosystem influenced by digital platforms, community co-ownership, and multi-actor coordination. As such, this study proposes a conceptual model of dynamic competitiveness informed by three integrated theoretical perspectives:

The Value Creation Model (Ryall, 2013), which views firms as participants in a networked value system.

The Sharing Economy Framework (Demary, 2015), which emphasizes the role of access-based models, platforms, and participatory systems; and

The Resource-Based View (RBV) (Kesuma et al., 2024), which underlines the importance of internal capabilities and strategic deployment.

The model developed in this study theorizes those strategic antecedents—such as innovation strategy (Rianawati et al., 2024), platform integration (Kang & Na, 2020), community engagement (CPI, 2024), and policy frameworks (PT PLN, 2021)—interact through mediating mechanisms, including value creation positioning, participatory energy models, and strategic resource deployment. These, in turn, generate renewable energy competitiveness as the core outcome. The model also considers how competitiveness manifests in broader societal outcomes like technology adoption, energy access, and inclusive energy transition (IRENA, 2017; Setyawati & Setiawan, 2024).

By building a model fully grounded in Indonesia's policy trajectory, industrial structure, and institutional behavior, this study contributes to both theoretical advancement and practical application in the domain of energy transition strategy and competitiveness analysis.

Study Objectives

This study aims to explore and explain the determinants of dynamic competitiveness in Indonesia's renewable energy sector through the development and application of a conceptual model grounded in three strategic theories: Value Creation Model, Sharing Economy Theory, and the Resource-Based View.

The specific objectives are to:

Theoretically synthesize the drivers, mechanisms, and outcomes of renewable energy competitiveness using established strategic frameworks (Ryall, 2013; Demary, 2015; Kesuma et al., 2024).

Contextualize the model within Indonesia's renewable energy policy landscape, market dynamics, and institutional characteristics (PT PLN, 2021; IESR, 2025; McKinsey, 2024).

Propose a structured framework linking strategic antecedents, mediators, and competitiveness outcomes—while also acknowledging cascading social implications like access and inclusion (IRENA, 2017; CPI, 2024).

Provide implications for policymakers, RE firms, investors, and platform innovators to foster an ecosystem-oriented approach to competitive advantage in renewable energy.

II. Literature Review

The energy transition literature has expanded significantly in the past decade, reflecting the growing urgency to decarbonize national economies while ensuring affordability, inclusivity, and resilience. In this context, renewable energy (RE) is no longer seen as a peripheral sector but as a core engine of national competitiveness and long-term economic transformation. However, in emerging economies such as Indonesia, the notion of competitiveness must be interpreted in ways that extend beyond price or technology; it requires theoretical tools that account for complexity, capability, and ecosystem-level coordination.

This chapter reviews existing literature relevant to the conceptual model developed in this study. It is structured around three pillars: (1) foundational strategic theories that explain how dynamic competitiveness emerges, (2) antecedent conditions that enable firms and ecosystems to compete, and (3) societal outcomes that validate the success of RE competitiveness. By synthesizing insights from the fields of strategic management, sharing economic research, innovation, and policy analysis, this chapter clarifies the conceptual gaps in current literature and justifies the integrated model used in this study.

Theoretical Foundation of Dynamic Competitiveness

Dynamic competitiveness in the renewable energy sector cannot be adequately explained through a single theoretical lens. Instead, this study integrates three complementary theories that collectively account for the strategic, relational, and capability-based dimensions of competitive advantage: Value Creation Theory (Ryall, 2013), the Sharing Economy Framework (Demary, 2015), and the Resource-Based View (RBV) (Kesuma et al., 2024; Santana-Sarmiento et al., 2019).

Value Creation Theory and Ecosystem Strategy

Ryall (2013) reconceptualizes competition as a matter of positioning within a broader value-creating system, rather than simply outperforming rivals on cost or efficiency. According to this framework, firms succeed when they contribute more value to the ecosystem than others can—either through unique offerings, strategic complementarities, or network positioning. In the renewable energy context, especially in markets like Indonesia where regulatory frameworks, infrastructure, and public utilities (e.g., PLN) form a dense interdependence, this logic is highly applicable.

Sumarsono et al. (2022) demonstrate that RE competitiveness in Indonesia is heavily shaped by how firms navigate and align with actors such as regulators, financiers, and local governments. Competitive advantage, then, lies in a firm's ability to create and capture value within a network—an idea that challenges traditional notions of firm-centric strategy and resonates with Ryall's theoretical insights.

Sharing Economy Logis in Renewable Energy

Demary (2015) outlines how the sharing economy introduces new competitive dynamics rooted in access, digital platforms, and user co-participation. The logic of the sharing economy—built around peer-to-peer models, collaborative consumption, and decentralized asset use—is increasingly relevant for renewable energy deployment in geographically dispersed markets such as Indonesia.

Kang and Na (2020) expand this logic by arguing that sharing economy strategies promote sustainable advantage when firms emphasize platform scalability, user trust, and value co-creation. In the RE sector, this translates into energy cooperatives, virtual

power plants, and community-owned solar systems. Dabbous and Tarhini (2021) further reinforce this by showing how sharing models foster innovation, inclusiveness, and competitive differentiation through network participation.

These insights are critical for Indonesia, where limited grid infrastructure and regional development gaps create a natural environment for distributed, platform-based RE solutions—making the sharing economy an essential theoretical lens for understanding modern competitiveness

Resource-Based View and Strategic capability Deployment

The Resource-Based View (RBV) remains a dominant theory in strategic management for explaining sustained competitive advantage. According to RBV, firms achieve superior performance by developing and deploying Valuable, Rare, Inimitable, and Non-substitutable (VRIN) resources (Kesuma et al., 2024). In the renewable energy sector, this includes not only technological assets but also institutional knowledge, human capital, and stakeholder relationships.

Santana-Sarmiento et al. (2019) apply RBV in the wind energy sector and conclude that firm performance is significantly influenced by intangible resources like project experience, regulatory expertise, and local legitimacy. Similarly, Mailani et al. (2024) emphasize that in emerging markets, it is the strategic deployment of resources—rather than just possession—that creates advantage. This nuance is particularly important in Indonesia, where firms must operate under regulatory uncertainty and infrastructure fragmentation.

Together, these perspectives justify RBV as a foundational element in the conceptual model, especially when linked to policy frameworks, community engagement, and firm-level innovation strategies.

Strategic Antecedents of Renewable energy Competitiveness

Strategic antecedents refer to the organizational, structural, and contextual factors that shape the capacity of firms and networks to create and sustain competitive advantage in renewable energy markets. In Indonesia, these antecedents are particularly relevant due to institutional asymmetries, regional disparities, and market fragmentation.

This section reviews the literature on four key antecedents included in the conceptual model: innovation strategy, digital platform integration, community engagement, and policy and regulatory frameworks.

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Innovation and Green Business Strategy

Innovation is widely recognized as a core driver of competitiveness in the renewable energy sector. Rianawati et al. (2024) argue that innovation in business processes and technologies enhances firms' adaptive capacity and strategic agility, especially in complex environments like Indonesia's blue economy. This insight aligns with Zhang and Walton (2017), who show that eco-innovation—when supported by resource-based capabilities—can simultaneously improve sustainability and competitive positioning.

Din et al. (2024) further explore how green human resource management (HRM) and innovation practices reinforce each other in achieving sustainable advantage. In the context of renewable energy, innovation extends beyond product development; it includes new financing models (e.g., blended finance), microgrid deployment strategies, and institutional co-design with stakeholders.

This literature reinforces innovation strategy as a foundational antecedent for competitiveness—especially in contexts where technology adoption must be localized, customized, and policy-sensitive.

Digitalization, Platforms, and Network Participation

Digital platforms play an increasingly central role in shaping the renewable energy landscape by enabling peer-to-peer energy trading, real-time grid management, and community-based financing mechanisms. Kang and Na (2020) argue that platform integration is not merely a technological issue but a strategic move that enhances scalability, co-creation, and network-based advantage.

In the context of the sharing economy, Dabbous and Tarhini (2021) show that platforms allow for innovation diffusion at lower transaction costs, making energy more accessible to underserved segments. Mailani et al. (2024) support this by highlighting the importance of digital tools for enabling inclusive participation in green supply chains.

These studies position digital platforms not just as tools, but as strategic infrastructures for value creation—particularly vital in Indonesia, where energy markets are dispersed and grid connectivity is uneven.

Community Engagement and Co-production in Renewable Energy

In energy transition literature, community engagement has shifted from a social responsibility narrative to a strategic necessity—particularly in rural and under-electrified regions. CPI (2024) emphasizes that decentralized RE deployment is more sustainable and accepted when communities are involved in planning, ownership, and maintenance.

Aditya et al. (2025) echo this by pointing to Indonesia's socio-cultural diversity and the importance of tailoring RE models to local governance norms. Without community buy-in, projects may face resistance, under-utilization, or sustainability risks.

Hence, community engagement acts as both a legitimacy mechanism and a capability-enhancer, directly contributing to RE competitiveness by aligning firms with local knowledge systems and demand-side dynamics.

Policy Alignment and Institutional Support

Institutional alignment—reflected in regulatory clarity, investment incentives, and long-term planning—is perhaps the most decisive antecedent in determining whether RE competitiveness can be realized at scale. The RUPTL 2021–2030 outlines Indonesia's target of 51.6% of new capacity from renewable sources, yet implementation remains challenged by permit bottlenecks, price risks, and institutional fragmentation (PT PLN, 2021; Climate Transparency, 2024).

McKinsey & Company (2024) highlights that policy clarity and consistency are critical for attracting private capital and international cooperation under programs like the Just Energy Transition Partnership (JETP). Chicago Policy Review (2023) further argues that while Indonesia's climate ambition is strong, its administrative readiness and sectoral coordination lag.

From a competitive perspective, policy alignment creates the rules of the game, reducing transaction costs and enabling firms to make long-term, strategic investments. Thus, policy frameworks must not only exist, but they must also be bankable, enforceable, and credible to act as meaningful antecedents to RE competitiveness.

Renewable Energy Competitiveness: Definitional and Empirical Perspectives

Renewable energy (RE) competitiveness is a multi-dimensional concept that goes beyond cost leadership or technology superiority. In emerging economies like Indonesia, it must reflect firms' and ecosystems' ability to operate under structural constraints, respond to regulatory volatility, collaborate across value chains, and deliver energy solutions that are not only efficient but also accessible and inclusive. This section reviews how existing literature defines, measures, and contextualizes RE competitiveness, drawing both from empirical studies in Indonesia and from broader international frameworks

Multi-Dimensional Nature of RE Competitiveness

In developed countries, RE competitiveness is often framed in terms of achieving levelized cost of electricity (LCOE) parity with fossil fuels. However, in markets like Indonesia, where infrastructural and institutional asymmetries are prevalent, competitiveness must account for:

Regulatory agility,

Institutional engagement,

Project Bankability,

And regional adaptability (IESR, 2025; McKinsey & Company, 2024).

BNEF and IESR (2021) stress that attracting foreign direct investment (FDI) in solar and wind projects requires not just cost-efficiency but a functioning investment ecosystem—one that provides land access, guaranteed offtake agreements (e.g., PPAs), and long-term policy consistency. Thus, RE competitiveness is an emergent quality of the interaction between firm strategies, state institutions, and financial actors.

Ecosystem and Market-Based Approaches

Sumarsono et al. (2022) offer an ecosystem-based view of competitiveness, showing that solar PV deployment in Indonesia is heavily influenced by actor coordination across sectors: from PLN and ESDM to local governments, IPPs, and end users. Competitiveness here is not just a firm-level characteristic, but a systemic outcome driven by collaborative and competitive dynamics.

This aligns with Ryall's (2013) value creation framework, which views firms as participants in interdependent value networks. In Indonesia, where market entry is shaped by informal norms, local politics, and centralized power structures, strategic positioning in these networks is a critical determinant of RE competitiveness.

Institutional and Infrastructure Readiness

The Indonesian government has taken steps to create enabling conditions for RE development, including through its RUPTL 2021–2030 roadmap and participation in the JETP. However, as highlighted by Climate Transparency (2024) and the Ministry of Energy and Mineral Resources (2024), these efforts are often undermined by:

1. Delayed permitting processes,
2. Unbankable feed-in tariffs,
3. And grid limitations in non-Java regions.

The Electricity Statistics Book (2024) reveals that grid capacity additions have not kept pace with RE potential, particularly in outer island provinces. This infrastructure gap reduces the feasibility of competitive RE bidding and delays project implementation—even for firms with strong internal capabilities.

Global Benchmarks and Comparative Indicators

Comparative assessments by BloombergNEF (2024) and Climatescope (2024) rank Indonesia behind several ASEAN peers in terms of RE investment attractiveness. Barriers include high capital costs, unclear auction mechanisms, and lack of transparency in project approval. Nevertheless, Indonesia is seen as a high-potential market with latent competitiveness, provided reforms continue under the Presidential Regulation 112/2022 and JETP implementation.

From a strategic perspective, competitiveness is not only a static score - it is a dynamic potential, contingent upon regulatory alignment, investor confidence, and ecosystem readiness. This validates the use of strategic positioning, resource deployment, and participatory models as central mediators in the conceptual model proposed by this study.

Cascading Implications: Access, Inclusion, and Just Transition

While much of the literature on renewable energy (RE) focuses on technology, policy, and market mechanisms, an emerging body of work emphasizes that RE competitiveness must also be judged by its societal outcomes. In Indonesia—an archipelagic state with persistent regional inequalities—energy transition strategies must simultaneously address infrastructure development, energy equity, and social inclusion. This section discusses two major “cascading implications” of RE competitiveness: (1) technology adoption and energy access, and (2) inclusive energy transition and just development.

Technology Adoption and Energy Access

The ability of renewable energy systems to scale in Indonesia is inseparable from their accessibility across geographic, socio-economic, and infrastructural boundaries. IRENA (2017) emphasizes that renewable energy must be understood not only as a technology deployment challenge but also as a service delivery innovation, particularly in underserved regions.

CPI (2024), in its Electrifying the Last Mile report, provides strong empirical support for the argument that competitive RE systems must demonstrate relevance to local needs. Success metrics include not only megawatts installed, but also:

1. Number of households electrified,
2. Reliability of supply,
3. Community training and maintenance capabilities.

Ember (2024) reinforces this view by showing that countries which excel in RE competitiveness typically outperform in access expansion, especially when modular, distributed systems like mini-grids and rooftop solar are used.

Thus, in the Indonesian context, technology adoption and energy access are not separate from competitiveness—they are manifestations of it. Competitive RE ecosystems enable faster, cheaper, and more inclusive energy rollouts.

Inclusive Energy Transition and Equity-Based Development

The second cascading implication—inclusive energy transition—relates to how the benefits and burdens of RE development are distributed. Setyawati & Setiawan (2024) emphasize that energy transition strategies must explicitly consider spatial and social equity. This includes directing RE investments to coal-producing provinces (e.g., South Sumatra, East Kalimantan), where jobs and revenues are at risk due to fossil fuel phase-outs.

The study argues that Indonesia can “spur growth and equity” by using RE competitiveness to support:

1. Local job creation and reskilling,
2. Provincial infrastructure development,
3. Community co-ownership models.

This aligns with global discussions on “Just Energy Transition”, which call for a shift from climate-centric to people-centric approaches (Chicago Policy Review, 2023). In Indonesia, where many communities depend on fossil-based industries, failure to integrate social considerations may create resistance, under-utilization, and legitimacy crises. By treating inclusion as an outcome of competitiveness, not a competing goal, the conceptual model frames equity as an indicator of system performance, not merely an ethical add-on. Competitive RE systems must therefore be both efficient and just.

Synthesis of Literature and Research Gap

The reviewed literature demonstrates that renewable energy (RE) competitiveness is a multidimensional phenomenon shaped by strategic capabilities, institutional frameworks, participatory platforms, and socio-technical systems. However, despite a growing body of work across energy policy, strategy, and innovation, existing studies often remain fragmented, addressing only parts of what constitutes dynamic competitiveness in emerging energy ecosystems.

Fragmentation in Existing Studies

A key gap lies in the lack of integrative models that combine strategic theory with real-world energy transition challenges. Most studies focus on one dimension:

RBV-oriented research (Kesuma et al., 2024; Santana-Sarmiento et al., 2019) explains internal capability formation but often omits institutional complexity.

Sharing economy literature (Demary, 2015; Dabbous & Tarhini, 2021) emphasizes access and participation but lacks discussion on competitive advantage in regulated energy sectors.

Policy and governance analyses (PT PLN, 2021; Climate Transparency, 2024) highlight systemic barriers but do not explore how firms strategically navigate them.

Similarly, even though ecosystem perspectives have emerged (Sumarsono et al., 2022), few studies explain how firms align innovation, resources, and platforms to achieve competitive positioning in countries like Indonesia, where regulation, infrastructure, and financing are highly uncertain.

Overlooked Role of Participation and Inclusion

Many models of RE competitiveness are anchored in LCOE or investment attractiveness (BloombergNEF, 2024; Climatescope 2024), without adequately incorporating cascading outcomes like access expansion or social inclusion. Yet, CPI (2024), Setyawati & Setiawan (2024), and Ember (2024) make it clear: in the Indonesian context, competitive success is inseparable from broader societal impact.

Adopting a just and inclusive energy transition lens is not only ethically important—it is strategically essential for system resilience and legitimacy. Still, few frameworks integrate this within the core logic of competitiveness.

Conceptual Integration Proposed by This Study

To address these gaps, this study proposes a multi-theoretical conceptual model that integrates:

Value Creation Model → explains ecosystem positioning (Ryall, 2013),

Sharing Economy Framework → explains digital access and participatory competitiveness (Demary, 2015),

RBV → explains internal capabilities and strategic resource deployment (Kesuma et al., 2024; Mailani et al., 2024).

This integrated model positions renewable energy competitiveness as the central outcome, driven by innovation strategy, platform integration, community engagement, and policy frameworks, mediated through value creation, participation, and resource orchestration.

It also uniquely treats technology adoption, energy access, and inclusive transition as cascading manifestations of competitiveness—thus aligning firm-level strategy with national-level development outcomes.

Novelty and Relevance

This study is distinct from existing research in three critical ways:

It synthesizes three strategic theories rarely combined in RE competitiveness literature.

It applies the model to Indonesia, a country with high potential but structural barriers—an underrepresented context in competitiveness frameworks.

It frames RE competitiveness not only as a business imperative but as a developmental lever tied to inclusion, equity, and long-term energy justice.

The insights from sources like Unlocking Investment to Triple Renewables by 2030 (BloombergNEF, 2024) and Unlocking Indonesia's Renewable Potential (IESR, 2025) confirm the urgency of such a holistic approach. Without competitiveness, investment will stagnate. Without inclusion, legitimacy will erode.

III. Discussion

This chapter discusses the conceptual model developed to explore the dynamics of competitiveness in Indonesia's renewable energy (RE) sector. Grounded in the Value Creation Model (Ryall, 2013), the Sharing Economy Framework (Demary, 2015), and the

Resource-Based View (RBV) Theory (Kesuma et al., 2024), the model provides an integrated perspective on how firms, platforms, institutions, and communities interact within an evolving renewable energy ecosystem. It synthesizes empirical insights and strategic theory to explain how certain antecedents—innovation strategy, platform integration, community engagement, and policy frameworks—interact through mediating mechanisms to produce RE competitiveness. The discussion proceeds through a systematic explanation of the model, detailing its theoretical foundation, strategic antecedents, mediators, and primary outcome. It concludes with cascading societal implications and an integrative synthesis.

Theoretical Foundations of Dynamic Competitiveness in Renewable Energy

Understanding the dynamic competitiveness of renewable energy firms and ecosystems in Indonesia requires a robust theoretical grounding. This section outlines the three core frameworks that underpin the conceptual model: the Value Creation Model, the Sharing Economy Framework, and the Resource-Based View (RBV). These frameworks collectively support a systemic understanding of how competitiveness emerges not only from firm-internal assets but also from interactions within a broader ecosystem of policies, platforms, and participation mechanisms

Value Creation Theory and Ecosystem Positioning

At the core of the model is Ryall's (2013) Value Creation Model, which emphasizes that competitive advantage is not solely about outperforming rivals but about positioning oneself to create more value in the system than others can. In dynamic and complex industries like renewable energy, firms must strategically position themselves within value network - systems of complementary assets and actors that co-create economic value.

In the Indonesian RE context, where public utilities (e.g., PLN), independent power producers (IPPs), government regulations (RUPTL), and community-based systems (CPI, 2024) interact, Ryall's theory is particularly useful. It implies that competitiveness arises not just from cost-efficiency or innovation, but from the ability to negotiate favorable positions in value-creating partnerships—such as PPAs (Power Purchase Agreements), technology alliances, and project consortiums.

Sharing Economy Framework and Participation Models

The second theoretical pillar is the Sharing Economy, which offers a lens to understand how digital platforms, community ownership, and peer-to-peer (P2P) energy models contribute to RE diffusion and competitiveness. Demary (2015) frames the sharing economy as a disruptive market logic wherein resource access is prioritized over ownership, and value is co-created by users and providers through networked platforms.

In Indonesia, the potential for digitally facilitated energy access—whether through virtual PPAs, cooperative solar projects, or energy-sharing platforms—links directly to the need for scalable, decentralized RE systems. Kang & Na (2020) further identify strategic characteristics that promote sustainable competitive advantage within sharing economy businesses: innovation, value co-creation, and consumer participation. This logic supports models like solar rooftops, microgrids, and distributed energy where communities are active participants, not passive consumers.

Thus, the sharing economy framework enhances the model by embedding social and technological participation as a core dimension of competitiveness, especially in regions underserved by centralized infrastructure.

Resource-Based View (RBV) and Strategic Capability Deployment

The third and most widely applied theory in competitiveness studies is Resource-Based View (RBV). According to Kesuma et al. (2024), RBV emphasizes that sustainable competitive advantage arises from resources that are Valuable, Rare, Inimitable, and Non-substitutable (VRIN). In renewable energy, such resources may include:

1. Advanced technological capabilities (e.g., smart grid integration),
2. Institutional know-how (e.g., navigating RUPTL and FIT schemes),
3. Human capital trained in RE engineering and financing,
4. Strong reputational legitimacy among stakeholders and financiers.

In emerging markets, RBV gains nuance when linked with external constraints like regulatory uncertainty and underdeveloped supply chains. The work by Santana-Sarmiento et al. (2019) in wind energy and Mailani et al. (2024) in sustainable business models both reinforce that resource mobilization and deployment—not just ownership—are what define competitiveness.

1. In Indonesia's case, strategic resource deployment must be adaptive to:
2. Policy volatility (Climate Transparency, 2024),
3. Uneven infrastructure (IESR, 2025),
4. And collaborative ecosystems (Sumarsono et al., 2022).

RBV in this model thus acts as the internal engine through which firms leverage and transform their unique capabilities to respond to external complexity.

Strategic Antecedents Shaping Renewable Energy Competitiveness

Strategic antecedents are the enabling conditions that influence a firm or ecosystem's capacity to attain renewable energy (RE) competitiveness. In the Indonesian context, the dynamic competitiveness of the RE sector depends not only on internal firm attributes, but also on the quality of innovation strategy, digital infrastructure, grassroots participation, and policy alignment. These antecedents create the foundation from which competitive advantages can be developed and transformed into performance.

Innovation Strategy

Innovation strategy is a cornerstone of RE competitiveness, especially in emerging economies with technological gaps and institutional challenges. According to Rianawati et al. (2024), innovation in Indonesia's blue economy sector significantly enhances competitive advantage when it is aligned with strategic capabilities and stakeholder demands. This insight translates well to the RE sector, where firms must not only adopt but also integrate technological, process, and product innovations into a coherent strategy.

Zhang and Walton (2017) argue that eco-innovation—particularly when supported by both RBV and institutional pressures—can improve environmental and financial performance. For RE firms in Indonesia, this might include innovations in modular solar technologies, smart inverters, off-grid mini-grids, and mobile app-based demand forecasting. Innovation strategy here is not limited to R&D expenditure; it also includes the capacity to innovate business models, financing structures (e.g., blended finance), and consumer engagement methods.

Therefore, innovation strategy serves as a key antecedent by enhancing a firm's agility and differentiation in a complex, highly regulated sector.

Platform Integration and Digital Collaboration

The integration of digital platforms is increasingly central to RE competitiveness. Kang & Na (2020) show that strategy characteristics in sharing economy firms—especially those that emphasize co-creation and consumer participation—directly contribute to sustainable competitive advantage. In the context of Indonesia's renewable energy sector, such platforms can facilitate:

1. Peer-to-peer energy trading,
2. Demand aggregation,
3. Virtual net metering,
4. And digital financing schemes for solar projects.

These models reduce transactional costs and enhance consumer empowerment, both critical in markets with access disparities. Moreover, they embody the logic of the sharing economy by emphasizing access over ownership, network effects, and platform scalability.

In Indonesia, initiatives that support virtual PPAs and digital onboarding of consumers into energy cooperatives align directly with the government's push for decentralized and democratized energy. Thus, platform integration is not just a technological enabler, but a strategic lever for participatory competitiveness

Community Engagement for Energy Decentralization

Decentralized energy systems are gaining prominence in Indonesia's strategy to electrify rural and remote areas (CPI, 2024). In such contexts, community engagement is not an optional complement to RE deployment, it is a strategic necessity.

CPI's "Electrifying the Last Mile" initiative highlights the need to adapt RE systems to community needs, cultural values, and governance structures. Failure to engage local stakeholders often results in project delays, underutilized infrastructure, or even system abandonment. Conversely, high community ownership—both in governance and technical operations—can lead to sustained energy use and localized economic development.

In the proposed model, community engagement functions as an antecedent by fostering social legitimacy, reducing soft barriers, and enabling demand-side participation, which support broader ecosystem competitiveness. It reinforces Ryall's value creation positioning by embedding the firm within stakeholder networks that co-produce energy solutions.

Policy and Regulatory Frameworks

The final antecedent—policy and regulatory framework plays a central role in shaping RE competitiveness at the systemic level. The RUPTL 2021–2030 outlines Indonesia's official targets for achieving 23% renewable energy in its national energy mix by 2025 and 51.6% of new capacity additions from RE sources by 2030. However, as Climate Transparency (2024) and McKinsey (2024) note, implementation remains uneven due to:

1. Delayed permits,

2. Lack of feed-in tariffs (FiTs),
3. Absence of bankable project frameworks,
4. And slow rollout of grid infrastructure.

This misalignment between policy design and execution creates regulatory risk—disincentivizing investment and delaying project development. The strategic challenge is not merely about policy availability, but policy predictability and enforceability.

In the model, policy and regulation act as a structural antecedent that shapes the boundary conditions under which firms can pursue innovation, participate in platforms, or engage communities. It also feeds directly into the mediators, particularly resource deployment, by enabling or constraining access to land, licenses, capital, and subsidies.

Mediating Mechanisms Linking Antecedents to Competitiveness

In the conceptual model, mediators serve as the bridge between antecedents (conditions) and outcomes (performance). They explain how innovation, platform strategies, engagement, and policy environments transform into renewable energy competitiveness. Drawing from Ryall's (2013) Value Creation theory, Sharing Economy logic (Demary, 2015), and the RBV (Kesuma et al., 2024), the mediators in this model are:

1. Value creation positioning,
2. Sharing economy participation, and
3. Strategic resource deployment.

Value Creation Networking Positioning

Ryall (2013) redefines competition not just as rivalry between firms, but as a matter of positioning in value networks—ecosystems of firms, governments, and users who co-create and allocate value. This shifts the analysis from “how do I beat my competitors?” to “where can I create unique and defensible value within a network?”

1. In the context of Indonesia's RE landscape, such positioning determines whether a firm secures:
2. Access to long-term PPAs (Power Purchase Agreements),
3. First-mover advantage in new regions (e.g., East Indonesia),
4. Preferential treatment under public-private partnerships (RUPTL),
5. Or access to innovative consortiums, such as energy cooperatives or blended-finance platforms (IESR, 2025).

For example, a solar IPP that collaborates with local governments and community leaders may gain project legitimacy, accelerate land acquisition, and co-finance grid connections—advantages that competitors outside the network cannot easily replicate. Thus, network positioning acts as a mediator that enables firms to convert their strategic antecedents into a unique competitive foothold.

Sharing Economy Participation and Social Diffusion

Sharing economy participation mediates competitiveness by allowing firms and platforms to scale more efficiently through user participation, rather than through capital-intensive expansion.

Demary (2015) argues that sharing economy firms rely on network externalities, in which each additional user enhances the total value of the system. This is highly relevant for Indonesia, where renewable energy access remains uneven and centralized infrastructure faces geographical limitations.

Sharing economy participation models such as rooftop solar cooperatives, peer-to-peer energy trading, and energy-as-a-service platforms, firms can reduce acquisition costs, increase customer loyalty, and enhance scalability. As Kang & Na (2020) and Dabbous & Tarhini (2021) show, these models foster trust, value co-creation, and efficiency, particularly in low-income or underserved areas.

In this sense, sharing economy participation enables strategic antecedents—such as innovation and community engagement—to be transformed into competitive outcomes through social diffusion and networked participation.

Core Outcome: Renewable Energy Competitiveness

Renewable energy competitiveness refers to the ability of firms, institutions, and platforms to deliver clean energy solutions that are technologically viable, economically attractive, and institutionally aligned in a dynamic and evolving market. In Indonesia's context, this concept extends beyond traditional cost or efficiency metrics; it reflects the capacity of energy actors to succeed within an ecosystem marked by regulatory complexity, geographic fragmentation, and increasing social expectations.

This section interprets renewable energy competitiveness through three interrelated lenses:

1. competitive positioning in emerging markets,

2. market structure and strategic ecosystems, and
3. institutional enablers.

Defining RE Competitiveness in Emerging Economies

In developed markets, RE competitiveness is often defined by levelized cost of electricity (LCOE) or grid parity. However, as noted by IESR (2025) and McKinsey (2024), in emerging markets like Indonesia, competitiveness also includes:

1. Ability to navigate institutional complexity (e.g., PPA contracts, land permits),
2. Building investor trust despite policy volatility,
3. Managing fragmented supply chains across islands and provinces,
4. Adapting to high-cost capital environments.

Indonesia's RE firms must not only deliver cheaper electricity but also create value for regulators, communities, and financiers. This multifaceted nature reflects the strategic orientation discussed by Ryall (2013) where competitiveness is derived not from rivalry alone, but from ecosystem positioning and partner synergy.

Hence, the model defines RE competitiveness as a multi-dimensional outcome emerging from strategic and relational capabilities — especially relevant to markets with evolving governance structures and transitional energy policies.

Market Structure, Innovation, and Strategic Ecosystems

Sumarsono et al. (2022) provide a detailed examination of solar PV competitiveness in Indonesia, highlighting how competitive dynamics shift as the market becomes less monopolistic and more ecosystems driven. They argue that:

1. Strategic alliances between private developers, local governments, and financiers improve project viability.
2. Innovation in deployment models (e.g., leasing, service contracts) boosts competitiveness.
3. Engagement in “non-price competition” such as technology leadership, execution speed, and stakeholder legitimacy matter more than pricing alone.

This aligns with Ryall’s ecosystem lens, in which firms gain advantage by positioning themselves where they can amplify value creation through synergies and complementarities. In Indonesia, competitive ecosystems include:

1. IPPs, EPC contractors, and international investors (McKinsey, 2024),
2. Policy implementers like ESDM and PLN (RUPTL),
3. Communities and cooperatives as prosumers (CPI, 2024).

Therefore, competitiveness arises not from one firm’s actions, but from how firms collaborate, negotiate, and adapt within these dynamic systems.

Institutional Enablers of Competitive Advantage

Institutional environments in Indonesia both enable and constrain RE competitiveness. On the one hand, national commitments to increase RE penetration (e.g., 23% by 2025, 51.6% of new capacity additions by 2030 per RUPTL) set a strong policy direction. On the other hand, Climate Transparency (2024) and BNEF (2024) point to regulatory delays, opaque permitting processes, and unbankable tariffs as core obstacles.

Yet, some firms have overcome these institutional frictions by developing institutional capabilities—including:

1. Legal expertise in land and contract negotiation,
2. Political networking to anticipate policy shifts,
3. Process innovation to accelerate compliance and construction timelines.

In RBV terms (Kesuma et al., 2024), these capabilities are intangible, path-dependent resources that are hard to replicate—thus forming the basis of sustained competitive advantage. Furthermore, McKinsey (2024) emphasizes the importance of aligning firm strategy with national initiatives (e.g., Just Energy Transition Partnership, green industry roadmaps) to secure credibility and funding.

Thus, institutions act not only as rule-makers but also as strategic fields in which competitiveness is contested and realized. Firms that can internalize institutional logic are more likely to sustain advantage in Indonesia’s complex RE landscape.

Cascading Implications: Indicators of Competitive Success

While renewable energy competitiveness is positioned as the core outcome of this conceptual model, its effectiveness is best understood through its cascading societal manifestations. In the Indonesian context—where energy access, technological diffusion, and social equity are national priorities—competitiveness in the renewable energy sector reveals itself through two key indicators: (1) technology adoption and energy access, and (2) an inclusive energy transition. These implications are not separate outcomes but are treated as observable validations of a competitive and responsive RE ecosystem.

These outcomes reflect how strategic and competitive gains manifest in the public domain and align with Indonesia's long-term goals, such as Net Zero 2060 and the Just Energy Transition Partnership (JETP).

Technology Adoption and Energy Access

Renewable energy competitiveness enhances the adoption of clean technologies when it leads to cost efficiency, operational scalability, and system reliability. According to IRENA (2017) and Ember (2024), the scaling of renewable deployment in Indonesia—particularly solar PV and mini-grids—depends heavily on firms' ability to innovate in delivery models and build trust among end-users.

For example:

1. Competitive firms lower the cost-per-kWh through operational efficiency and smarter procurement (IESR, 2025),
2. Competitive firms introduce modular systems tailored to remote or off-grid communities (CPI, 2024),
3. Competitive firms collaborate with public agencies and NGOs to deploy last-mile energy systems in underserved areas like Eastern Indonesia.

This reinforces the idea that competitiveness is not an end, but a mechanism to drive real-world impact. In essence, widespread technology adoption and access expansion are not separate from competitiveness—they are indicators that competitiveness is effective.

Inclusive Energy Transition and Equity-Based Development

A truly competitive RE ecosystem in Indonesia must also contribute to a just and inclusive transition—especially given the country's legacy dependence on fossil fuels and the regional imbalances in economic opportunity.

Setyawati & Setiawan (2024) argue that Indonesia's clean energy expansion can support growth and equity if projects are distributed across coal-producing provinces, paired with job creation and upskilling, and aligned with provincial development plans. They show that regions such as South Sumatra, East Kalimantan, and West Java can absorb large-scale renewable projects if competitiveness is not concentrated only in Java-Bali corridors.

The concept of an inclusive energy transition reflects the social legitimacy of competitiveness. It demonstrates that a firm or ecosystem is not just technologically superior but also socially responsive. It addresses questions such as:

1. Who benefits from RE competitiveness?
2. Are marginalized groups included as workers, owners, or customers?
3. Does competitiveness reduce inequality, or reproduce it?

Hence, inclusive energy transition is a cascading indicator that confirms whether RE competitiveness aligns with Indonesia's strategic development agenda and Sustainable Development Goals (SDGs).

Synthesis and Implications of the Model

The conceptual model developed in this study integrates three powerful theoretical lenses—Value Creation Theory (Ryall, 2013), the Sharing Economy Framework (Demary, 2015), and the Resource-Based View (RBV) (Kesuma et al., 2024)—to explain the dynamics of competitiveness in Indonesia's renewable energy sector. Through this integration, the model moves beyond firm-centric analysis to a systemic view of competition: one that is ecosystem-based, capability-driven, and participation-enabled.

This final section synthesizes the model's logic and contributions and outlines its implications across three dimensions:

1. theoretical integration,
2. strategic and policy guidance, and
3. academic contribution to the study of renewable energy competitiveness.

Integrating Theoretical Insights into a Unified Framework

The model demonstrates that competitiveness in the renewable energy sector is not driven by one isolated theory, but by the convergence of strategic positioning, resource configuration, and participatory mechanisms.

Ryall's (2013) Value Creation Model provides the logic for understanding competition as ecosystem positioning—especially relevant to RE firms operating through consortia, co-investment, and public-private platforms.

The Sharing Economy Framework adds a social and digital dimension, explaining how platforms, cooperatives, and distributed energy resources can mobilize participation and scale adoption.

The RBV anchors the model in firm-level capabilities, explaining how competitiveness is sustained through unique resource combinations and strategic deployment.

Together, these theories produce a holistic model of dynamic competitiveness that reflects Indonesia's fragmented geography, regulatory volatility, and evolving energy policy

Strategic Implications for Policymakers and Industry Actors

The model offers strategic insights for key stakeholders:

For firms: Competitive advantage requires more than technology—it demands strategic alliances, digital engagement, and institutional literacy. Firms that excel in resource deployment and value network positioning are more likely to survive Indonesia's policy and market turbulence (Sumarsono et al., 2022; McKinsey, 2024).

For policymakers: Competitiveness flourishes where policy is stable, permitting is streamlined, and incentives are bankable (RUPTL; Climate Transparency, 2024). More importantly, competitiveness must be inclusive—targeting regions and populations left behind in fossil-based development (Setyawati & Setiawan, 2024).

For investors and international partners: Understanding Indonesia's RE competitiveness requires attention to institutional complexity and ecosystem dynamics. Projects that enable sharing models, community ownership, or local capacity-building may yield higher long-term returns with lower reputational risk (CPI, 2024; IESR, 2025).

This model provides a diagnostic lens to evaluate where Indonesia's RE system is competitive—and where it remains structurally weak.

Contribution to the Literature on Energy Transition and Competitiveness

Most existing literature on renewable energy in emerging markets focuses on policy gaps, financing barriers, or technology diffusion. This paper contributes a novel theoretical synthesis by embedding the competitiveness debate within:

1. The ecosystem logic of value creation,
2. The decentralized participation enabled by the sharing economy,
3. And the capability-oriented logic of the RBV.

Moreover, by grounding the analysis specifically in the Indonesian case, it adds contextual specificity to global discussions on RE competitiveness—offering a model that can be adapted to other emerging economies with similar institutional and infrastructural asymmetries.

Visualizing the Conceptual Model

To summarize and visualize the logical structure of the theoretical arguments presented in this chapter, the following conceptual model integrates the core elements of dynamic competitiveness in Indonesia's renewable energy sector. Built upon the integration of Value Creation Theory, Sharing Economy logic, and the Resource-Based View (RBV), this model illustrates how strategic antecedents interact with mediating mechanisms to generate competitive advantage within a complex energy ecosystem. It also highlights the cascading societal implications of RE competitiveness, including expanded energy access and a more inclusive energy transition.

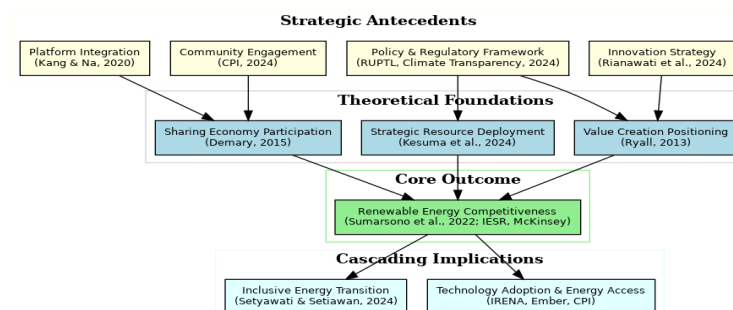


Figure 1 Conceptual Model of Dynamic Competitiveness in Indonesia's Renewable Energy Ecosystem

Summary**IV. Conclusion**

This study has developed an integrative conceptual model to explain the dynamics of renewable energy competitiveness in Indonesia — a sector characterized by regulatory complexity, geographic asymmetry, and socio-technical transformation. Drawing from the Value Creation Model (Ryall, 2013), the Sharing Economy Framework (Demary, 2015), and the Resource-Based View (Kesuma et al., 2024), the model captures how strategic antecedents — including innovation strategy, digital platform integration, community engagement, and policy frameworks — interact through mediating mechanisms to generate competitive outcomes.

Importantly, the model extends beyond firm-level metrics to include cascading societal outcomes, such as technology adoption, energy access, and an inclusive energy transition. In doing so, it aligns the notion of competitiveness with national policy goals (PT PLN, 2021; IESR, 2025) and global imperatives such as the Just Energy Transition Partnership (JETP).

The model's strength lies in its theoretical synthesis and contextual specificity. By integrating strategy, participation, and policy into one coherent framework, it responds to critical gaps in the literature, which often treat these elements in isolation. The model thus offers a strategic, systems-oriented view of how RE ecosystems evolve and compete — a perspective particularly relevant for countries like Indonesia that sit at the intersection of rapid development and global climate mandates.

In addition to its domestic relevance, the model also carries implications for Indonesia's position in the broader regional and global energy landscape. As countries across ASEAN and other emerging markets compete to attract investment in renewable infrastructure, manufacturing, and technology, the ability to develop a strategically aligned and inclusive energy ecosystem will be a key differentiator. Reports such as BloombergNEF's Climatescope 2024 have already highlighted Indonesia's untapped potential alongside the structural constraints that limit its attractiveness. By emphasizing the interplay between innovation, institutional alignment, and participatory engagement, this model contributes to understanding how Indonesia can strengthen its global competitiveness in the renewable energy economy and play a more active role in the international clean energy transition.

In conclusion, this study provides both a strategic blueprint and a scholarly invitation: to rethink competitiveness not only as firm performance, but as ecosystem evolution, stakeholder alignment, and national transformation. As Indonesia moves toward its net-zero goals, future research that builds on this model can play a vital role in bridging theory, policy, and action for a more competitive and inclusive renewable energy future.

Future Research Directions

First, empirical testing is essential. Future studies could use quantitative methods—such as structural equation modeling (SEM) or path analysis—to assess the relationships among strategic antecedents, mediating mechanisms, and the competitiveness outcome. These studies could draw on firm-level data, policy indicators, and market performance metrics to assess how innovation strategy, policy clarity, and platform integration shape competitive outcomes in practice.

Second, qualitative case studies or comparative project-level evaluations could examine how different types of renewable energy actors (e.g., independent power producers, platform-based startups, or community energy cooperatives) apply the elements of the model across Indonesia's diverse regional contexts.

Third, this model can be extended to other strategic sectors within Indonesia's energy transition landscape—such as green hydrogen, bioenergy, or the electric vehicle ecosystem—to evaluate whether the same antecedents and mediators apply or if new dynamics emerge.

Finally, a promising research direction lies in cross-national or ASEAN-level comparative analysis. Applying this model to other emerging economies—such as Vietnam, the Philippines, or Thailand—would allow scholars to identify structural, institutional, and strategic commonalities or divergences. This would enhance the model's external validity and contribute to a broader understanding of how renewable energy competitiveness evolves across different political economies. It would also inform Indonesia's relative positioning in regional clean energy investment flows, a critical factor for realizing long-term transition goals.

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