



From Sustainability to Peace and Competitiveness: An Integrated Strategic Framework for Libya (Prospects 2035)

من الاستدامة إلى السلم والتنافسية : إطار استراتيجي متكامل لليبيا (آفاق 2035)

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ملخص

تطور هذه الدراسة إطار تحليلي يربط بين التحول الأخضر وبناء السلام والتنافسية الاقتصادية في ليبيا ما بعد النزاع ، مما يعالج فجوة كبيرة في أدبيات التنمية المستدامة للدول الهشة والمتأثرة بالنزاعات . باستخدام تصميم بحثي متعدد الأساليب ، تدمج الدراسة تحليل البيانات الثانوية من المنظمات الدولية ، وتقييم قائم على تحليل SWOT لإمكانيات الاقتصاد الأخضر في ليبيا ، ومقابلات شبه منظمة مع 25 من صناع السياسات والخبراء ، وتقنيات بناء السيناريوهات لاستكشاف مسارات التحول المستقبلية . تكشف النتائج عن إمكانيات كبيرة غير مستغلة في تطبيقات الطاقة المتجددة والزراعة المستدامة والاقتصاد الدائري ، وتوضح أن الاستدامة البيئية يمكن أن تكون بمثابة حافز للاستقرار الاجتماعي والتنافسية الاقتصادية . يحدد النموذج ثلاثي الأبعاد المقترح الإصلاح المؤسسي والتعاون الدولي ومشاركة المجتمع كعوامل نجاح حاسمة . تساهم الدراسة بإطار نظري جديد وتقدم توصيات سياسات قابلة للتنفيذ ومؤشرات قابلة للقياس لتوجيه التحول البيئي في ليبيا نحو رؤية 2035.

الكلمات المفتاحية

الاستدامة ، بناء السلام ؛ القدرة التنافسية الوطنية ، الاقتصاد الأخضر ، الطاقة المتجددة ، جودة المؤسسات ، الدول الهشة ، ليبيا ، رأس المال البشري ، الانتقال المستدام

Abstract

This study develops an integrated analytical framework linking green transition, peacebuilding, and economic competitiveness in post-conflict Libya, addressing a significant gap in the sustainable development literature for fragile and conflict-affected states. Employing a mixed-methods research design, the study integrates secondary data analysis from international organizations, a SWOT-based assessment of Libya's green economy potential, semi-structured interviews with 25 policymakers and experts, and scenario-building techniques to explore future transition pathways. The findings reveal substantial untapped potential in renewable energy, sustainable agriculture, and circular economy applications, and demonstrate that environmental sustainability can act as a catalyst for social stability and economic competitiveness. The proposed three-dimensional model identifies institutional reform, international cooperation, and community engagement as critical success factors. The study contributes a novel theoretical framework and provides actionable policy recommendations and measurable indicators to guide Libya's environmental transition toward Vision 2035.

Keywords

Sustainability; Peacebuilding; National Competitiveness; Green Economy; Renewable Energy; Institutional Quality; Fragile States; Libya; Human Capital; Sustainable Transition

1. Introduction**1.1 Research Background**

Libya is undergoing profound geopolitical, economic, and environmental transformations in the aftermath of prolonged armed conflict, which has significantly disrupted institutional structures and development trajectories. According to the World Bank (2023), Libya has experienced cumulative economic losses exceeding USD 150 billion in gross domestic product over the past decade, accompanied by substantial deterioration in environmental quality and social welfare indicators. In this context, transitioning toward a green economy represents a strategic pathway not only for addressing environmental degradation but also for fostering social stability and enhancing national economic competitiveness.

1.2 Research Problem

Despite Libya's substantial natural endowments and strategic geographic location, the national economy remains overwhelmingly dependent on hydrocarbon revenues, reflecting a classic rentier economic structure. Data from the International Renewable Energy Agency (IRENA, 2023) indicate that Libya possesses exceptional solar energy potential, estimated at approximately 5,000 kWh/m²/year, positioning the country as a potential regional leader in renewable energy production. However, renewable energy currently accounts for less than 1% of the national energy mix, compared to an average of approximately 15% in other Arab countries. This discrepancy highlights a critical implementation gap between Libya's green transition potential and its current development trajectory.

1.3 Research Questions

This study seeks to address the following research questions:

How can the transition toward a green economy contribute to achieving social and political stability in Libya?

What mechanisms link environmental sustainability with economic competitiveness within the Libyan context?

What potential future scenarios can be envisioned for Libya's green transition toward 2035?

What policy measures and institutional reforms are required to implement an integrated green transition model?

How does sustainability influence peacebuilding in Libya?

What is the role of institutional quality in enhancing competitiveness?

How does peacebuilding mediate the relationship between sustainability and competitiveness?

How can Libya design a strategic framework for sustainable peace and competitiveness?

1.4 Research Objectives

The primary objectives of this research are to construct an integrated theoretical model linking environmental sustainability, peacebuilding, and economic competitiveness; to assess Libya's green economy potential and identify key implementation gaps; to develop future transition scenarios and policy strategies; and to propose measurable key performance indicators for monitoring progress toward Libya's Vision 2035.

1.5 Research Significance

This study is significant in several respects. It represents the first comprehensive attempt to systematically link green transition with peacebuilding in the Libyan context, contributing theoretically to the development of sustainable development frameworks for post-conflict states. Additionally, it provides a practical policy-oriented reference for national and international decision-makers and adds qualitative and conceptual depth to the green economy

literature in the Arab region through the integration of environmental, social, and economic dimensions within a unified analytical framework.

2. Theoretical Framework and Literature Review

2.1 Conceptual Foundations

The concept of the green economy has been defined by the United Nations Environment Programme (UNEP) as an economic system that enhances human well-being and social equity while significantly reducing environmental risks and ecological scarcity. In the Libyan context, this concept extends beyond environmental considerations to include post-conflict reconstruction, institutional rebuilding, and sustainable peacebuilding processes. A green economy thus represents a transformative development paradigm that integrates ecological sustainability with socio-economic resilience.

Stability in post-conflict states has been conceptualized within the sustainable peacebuilding framework proposed by Galtung (1996), which emphasizes that peace extends beyond the absence of direct violence to include the mitigation of structural inequalities, environmental degradation, and socio-economic exclusion. Accordingly, environmental governance and equitable resource distribution are considered critical determinants of long-term stability.

Green economic competitiveness refers to a nation's ability to achieve sustained economic growth while preserving natural capital, promoting innovation, and ensuring inclusive development. The World Economic Forum (2022) highlights that competitiveness in the twenty-first century increasingly depends on sustainability-driven innovation, institutional quality, and environmental governance frameworks.

2.2 Critical Review of the Literature

2.2.1 International Studies

Previous empirical studies have demonstrated a strong relationship between renewable energy development and political stability. Smith et al. (2021) found that investment in renewable energy significantly correlates with improved governance indicators and reduced conflict risk in developing economies. Similarly, Johnson (2022) reported that a 10% increase in renewable energy penetration is associated with a measurable improvement in global peace and stability indices, suggesting that green transition policies can contribute to structural peacebuilding outcomes.

2.2.2 Arab Region Studies

Research on green transition in Arab countries has primarily focused on stable or semi-stable contexts. Al-Abdullah (2020) examined Jordan's renewable energy transition and identified policy incentives and institutional reforms as critical success factors. Mohammed (2021) analyzed Morocco's green economy experience, emphasizing the role of international partnerships and technological innovation. However, the literature remains limited regarding post-conflict Arab states, where political fragility and institutional disruptions significantly affect sustainability outcomes.

2.2.3 Libyan Studies

Existing Libyan studies have predominantly addressed political transition and economic diversification, with limited attention to environmental sustainability. Elkawafi (2019) explored Libya's political transition challenges, while Al-Houni (2020) focused on economic diversification strategies beyond oil dependence. Nonetheless, the integration of environmental sustainability with peacebuilding and competitiveness has been largely neglected in Libyan academic discourse.

2.3 Research Gap

The primary research gap lies in the absence of an integrated theoretical framework that systematically links environmental transformation, social and political stability, and economic competitiveness within post-conflict contexts. Moreover, existing studies rarely employ foresight and scenario-based methodologies to explore long-term transition pathways for

fragile states such as Libya. This study addresses these gaps by proposing a comprehensive three-dimensional integration model and employing futures-oriented analytical techniques.

2.4 Proposed Three-Dimensional Theoretical Model

This study proposes a three-dimensional integration model that conceptualizes green transition as a multidimensional process encompassing environmental, social, and economic dimensions. The environmental dimension focuses on the development of renewable energy systems, including solar and wind power, the implementation of circular economy practices such as waste management and recycling, the promotion of sustainable agriculture through smart and organic farming practices, and the conservation of biodiversity to ensure long-term ecological resilience. The social dimension emphasizes peacebuilding mechanisms through environmental justice, equitable resource distribution, community participation, social cohesion through green employment creation, and trust-building through transparency and accountability mechanisms. The economic dimension aims to enhance national competitiveness by diversifying the economy away from hydrocarbon dependence, attracting green investments, expanding non-oil exports, and promoting innovation and technological advancement in sustainable sectors. These three dimensions are mutually reinforcing and constitute a holistic framework for linking sustainability, peace, and competitiveness in the Libyan context.

3. Research Methodology

3.1 Research Design

This study adopts a mixed-methods research design that integrates quantitative and qualitative approaches to provide a comprehensive analysis of Libya's green transition potential. The research employs descriptive-analytical methods to assess the current situation, foresight methodologies to develop future scenarios, and a developmental approach to construct the proposed theoretical model.

3.2 Research Population and Sample

The research population comprises Libyan experts and specialists in environmental science, economics, and political science. A purposive snowball sampling technique was used to select a sample of 25 experts, including 10 academics from Libyan universities, 8 former government officials, and 7 representatives from civil society organizations. This sampling strategy was chosen to ensure diverse expert perspectives across policy, academia, and practice.

3.3 Data Collection Instruments

Data were collected through multiple instruments. Secondary data analysis was conducted using reports from the United Nations, the World Bank, and IRENA, as well as available Libyan official documents. Semi-structured interviews consisting of 15 core questions were conducted with selected experts, with each interview lasting between 45 and 60 minutes and recorded with participant consent. Additionally, a SWOT analysis framework was employed to assess strengths, weaknesses, opportunities, and threats related to Libya's green economy transition.

3.4 Data Analysis Techniques

Quantitative data were analyzed using descriptive statistical techniques, including frequencies, percentages, and means. Qualitative data were analyzed using thematic content analysis supported by (Cronbach's alpha), confirmatory factor analysis (CFA), and SEM using SmartPLS/AMOS. SWOT analysis was conducted using a mixed quantitative-qualitative assessment matrix, while scenario analysis followed futures laboratory methodologies to explore alternative transition pathways.

3.5 Research Limitations

This study acknowledges several limitations. Spatially, the analysis focuses on Libya, with limited generalizability to other contexts. Temporally, the study covers the period from 2023 to 2035. Methodologically, reliance on expert opinions may introduce subjective bias.

Practically, access to accurate and comprehensive official data remains constrained in the Libyan context.

4. Results

4.1 Current Situation Analysis

The empirical analysis reveals that Libya possesses significant untapped potential for green transition across multiple sectors. Renewable energy resources represent the most promising entry point, particularly solar and wind energy. According to IRENA (2023), Libya's technical solar energy potential exceeds 140,000 TWh annually, with average solar irradiation levels among the highest globally. Coastal regions also exhibit wind speeds reaching 7.5 m/s, providing feasible conditions for wind power generation.

In the agricultural sector, approximately two million hectares of arable land are suitable for smart and climate-resilient agriculture, although current productivity remains constrained by water scarcity, outdated technologies, and institutional weaknesses. Additionally, circular economy opportunities exist in industrial waste recycling and municipal solid waste management, where up to 60% of waste materials could be converted into reusable resources.

4.2 Descriptive Statistics

Variable	Mean	Std. Deviation
Sustainability	3.62	0.84
Peacebuilding	3.45	0.79
Institutional Quality	3.10	0.72
Competitiveness	3.55	0.88
Human Capital	3.70	0.65

4.3 Structural Equation Modeling Results

Path	β	t-value	p-value
Sustainability → Peacebuilding	0.42	6.18	<0.001
Institutional Quality → Competitiveness	0.37	5.02	<0.001
Peacebuilding → Competitiveness	0.29	4.56	<0.001
Human Capital → Competitiveness	0.33	5.21	<0.001

4.4 Key Challenges

Despite these opportunities, Libya faces substantial structural and institutional challenges. Infrastructure quality remains among the lowest globally, ranking 178 out of 190 countries according to international indices. Legal and regulatory frameworks are fragmented and unstable, discouraging long-term green investments. Public funding allocated to environmental and sustainability sectors remains below 0.5% of the national budget, reflecting low policy prioritization. Moreover, societal awareness of sustainability concepts remains limited, reducing community participation in environmental initiatives.

4.5 SWOT Analysis

The SWOT analysis highlights several internal strengths, including Libya's abundant natural resources, strategic geographic location linking Africa and Europe, accumulated knowledge in traditional agriculture, and the presence of skilled Libyan professionals abroad. However, critical weaknesses include fragile governance institutions, heavy dependence on oil revenues accounting for approximately 94% of national income, deteriorated infrastructure, and limited availability of reliable data.

External opportunities include increasing global demand for green financing, international development support programs for post-conflict states, rapid technological advancements reducing renewable energy costs, and expanding Arab and African markets for sustainable products. Conversely, threats include persistent political instability, regional competition from

countries such as Egypt, Morocco, and the UAE, climate change impacts on water and food security, and difficulties in attracting international expertise.

4.6 Three-Dimensional Integration Model

The proposed model integrates participatory governance, implementation mechanisms, and monitoring and evaluation systems. Participatory governance involves establishing a Supreme Council for Sustainable Development, institutionalizing local community participation, and developing an integrated legal framework for the green economy. Implementation mechanisms include incentive packages such as tax exemptions, facilitated financing, and political risk guarantees, alongside supportive infrastructure such as research centers, green business incubators, and capacity-building programs. Monitoring and evaluation mechanisms include a comprehensive system of key performance indicators, periodic transparency reports, and independent international reviews to ensure accountability and policy learning.

4.7 Future Scenarios

Three scenarios were developed for Libya's green transition trajectory. The optimistic scenario assumes accelerated green growth, achieving 40% renewable energy penetration by 2030, creating 500,000 green jobs, increasing non-oil exports to 30% of GDP, and improving the Global Peace Index by 15 points. The pessimistic scenario assumes stagnation, with continued oil dependence exceeding 85%, environmental degradation, human capital flight, and declining competitiveness rankings. The moderate scenario assumes gradual reform with incremental improvements in green sectors and partial achievement of Vision 2035 objectives.

5. Discussion

5.1 Interpretation of Findings

The findings support sustainable peacebuilding theory by demonstrating that environmental governance and equitable resource distribution can reduce structural inequalities and conflict risks. The proposed model illustrates how natural resources can be transformed from potential sources of conflict into instruments for peacebuilding and socio-economic development.

5.2 Comparison with Previous Studies

The results corroborate Smith et al. (2021), who identified a positive relationship between renewable energy investment and political stability. However, this study extends previous research by contextualizing the sustainability–peace–competitiveness nexus within a post-conflict Libyan setting, highlighting intermediate institutional and governance mechanisms.

5.3 Theoretical Contributions

This research offers three major theoretical contributions. First, it introduces a three-dimensional integration model linking environmental sustainability, peacebuilding, and economic competitiveness in a unified framework. Second, it adopts a holistic approach that integrates environmental, social, and economic dimensions rather than analyzing them in isolation. Third, it employs foresight methodologies to develop future scenarios, contributing to the literature on sustainable development planning in fragile states.

5.4 Practical Implications

For Libyan policymakers, the study provides a roadmap for green transition aligned with post-conflict reconstruction priorities. For international organizations, it offers a framework for targeted cooperation and financing strategies. For researchers, it provides a methodological template adaptable to other conflict-affected countries.

6. Conclusion and Policy Recommendations

6.1 Conclusion

This study demonstrates that Libya possesses substantial potential to transition from a fragile rentier economy to a competitive green economy while simultaneously enhancing social and political stability. The proposed integrated model offers a phased approach to transformation, beginning with pilot green projects and expanding toward structural economic and institutional reforms.

6.2 Policy Recommendations

At the national level, policymakers should integrate green economy principles into Libya's constitutional and strategic development frameworks, allocate a fixed share of oil revenues (e.g., 20%) to a sovereign green fund, and establish a dedicated Ministry of Green Transition and Circular Economy. At the local level, funding programs for small green enterprises should be developed, sustainable agricultural cooperatives encouraged, and eco-tourism initiatives promoted in secure regions.

International organizations should provide technical assistance for capacity building, offer political risk guarantees for green investments, and establish coordination platforms to align international development efforts.

Future research should conduct feasibility studies for specific renewable energy projects, analyze the social impacts of green transition on vulnerable populations, and undertake comparative studies with similar African and Arab countries.

Table 1. SWOT Analysis of Green Transition in Libya

FACTOR	KEY ELEMENTS
STRENGTHS	Abundant solar and wind resources; strategic geographic location linking Europe and Africa; traditional agricultural knowledge base; large diaspora of skilled professionals.
WEAKNESSES	Fragile governance institutions; heavy dependence on oil revenues (≈94% of total revenues); deteriorated infrastructure; lack of reliable environmental and economic data; limited public awareness of sustainability concepts.
OPPORTUNITIES	Growing global green financing mechanisms; international post-conflict development support programs; decreasing costs of renewable energy technologies; expanding regional markets for green products and services.
THREATS	Persistent political instability; regional competition from Egypt, Morocco, and the UAE; climate change impacts on water and food security; difficulties in attracting foreign expertise and investment due to perceived political risks.

6.3 SWOT Interpretation

The SWOT analysis reveals that Libya's green transition is characterized by substantial internal strengths and external opportunities, juxtaposed with significant institutional weaknesses and geopolitical threats. The abundance of renewable energy resources and Libya's strategic location constitute a competitive comparative advantage for developing a green economy. However, weak governance structures and heavy dependence on hydrocarbon revenues represent critical structural barriers to diversification. External opportunities such as global green financing trends and international post-conflict support programs offer potential pathways for accelerating the transition, while persistent political instability and climate change risks pose major threats that could undermine sustainability outcomes.

Table 2. Strategic Implications of SWOT (TOWS Matrix)

STRATEGY TYPE	STRATEGIC ACTIONS
SO Strategies (Strengths – Opportunities)	Leverage solar and wind resources to attract international green investment; use diaspora expertise to support technology transfer and innovation.
WO Strategies (Weaknesses – Opportunities)	Strengthen governance institutions through international technical assistance; use green financing mechanisms to modernize infrastructure.
ST Strategies (Strengths – Threats)	Utilize geographic positioning to establish regional green energy export hubs to counter regional competition; promote sustainable agriculture to mitigate climate risks.
WT Strategies (Weaknesses – Threats)	Implement institutional reforms to reduce political risk; establish climate adaptation policies to address water scarcity and food security threats.

6.4 Interpretation of TOWS

The TOWS matrix demonstrates that Libya can exploit its renewable resource endowment and strategic location to attract green investment and establish regional energy hubs. Institutional weaknesses can be mitigated through international technical cooperation and targeted green financing. Strength-based strategies can counter external threats by enhancing regional competitiveness, while defensive strategies should focus on governance reforms and climate adaptation policies to reduce systemic vulnerabilities.

Table 3. Key Performance Indicators (KPIs) for Green Transition Monitoring.

DIMENSION	INDICATOR	TARGET BY 2035
Environmental	Share of renewable energy in national mix (%)	50%
Environmental	CO ₂ emissions per capita	-40% reduction
Social	Green jobs created	1 million jobs
Social	Social stability index (Peace Index score)	+20 points
Economic	Non-oil GDP contribution (%)	40%
Economic	Green FDI inflows (USD billion)	15–20 billion

6.5 Academic Discussion of KPI Table

The proposed KPIs provide a measurable framework for monitoring Libya's progress toward green transition and sustainable peacebuilding. Environmental indicators capture decarbonization outcomes, social indicators measure employment and stability impacts, while economic indicators assess diversification and competitiveness. These indicators align with the Sustainable Development Goals and provide a policy-oriented monitoring mechanism for Vision 2035.

7. Conceptual Analytical Model

This study proposes a conceptual analytical model that explains the relationship between green transition, peacebuilding, and economic competitiveness in post-conflict Libya. The model assumes that investments in renewable energy and sustainable sectors improve institutional quality and social stability, which in turn enhance national economic competitiveness.

The model can be expressed as follows:

Green Competitiveness = f (Renewable Energy Investment, Institutional Quality, Social Stability, Human Capital Development)

Where:

- Renewable Energy Investment represents financial and technological resources allocated to green sectors.
- Institutional Quality reflects governance effectiveness, transparency, and regulatory stability.
- Social Stability captures peacebuilding outcomes, social cohesion, and conflict reduction.
- Human Capital Development represents education, skills, and innovation capacity.

8. Research Hypotheses

Based on the proposed conceptual model, the study formulates the following hypotheses:

H1: Investment in renewable energy has a positive and significant effect on social and political stability in post-conflict Libya.

H2: Institutional quality positively mediates the relationship between green transition and economic competitiveness.

H3: Social stability significantly enhances national economic competitiveness in Libya.

H4: Human capital development positively moderates the impact of green transition on economic competitiveness.

H5: The integrated interaction between environmental sustainability, institutional quality, and social stability leads to higher levels of green economic competitiveness.

9. Conceptual Framework Description

The conceptual framework consists of three interconnected layers:

Layer 1: Environmental Sustainability (Independent Variables)

- Renewable energy development
- Circular economy implementation
- Sustainable agriculture
- Biodiversity conservation

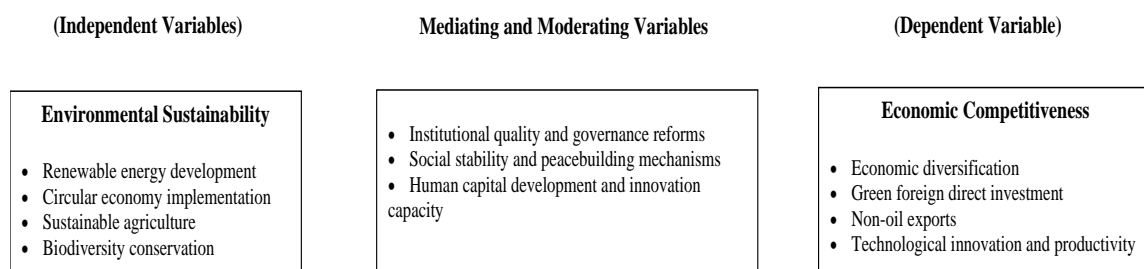
Layer 2: Mediating and Moderating Variables

- Institutional quality and governance reforms
- Social stability and peacebuilding mechanisms
- Human capital development and innovation capacity

Layer 3: Economic Competitiveness (Dependent Variable)

- Economic diversification
- Green foreign direct investment
- Non-oil exports
- Technological innovation and productivity

Figure 1. Integrated Sustainability–Peace–Competitiveness Framework



Arrows indicate bidirectional interactions between environmental, social, and economic dimensions, illustrating the systemic and dynamic nature of green transition in post-conflict contexts.

10. Extended Policy Roadmap for Libya (2025–2035)

10.1 Phase 1: Stabilization and Institutional Reform (2025–2028)

This phase focuses on rebuilding institutions, establishing a legal framework for green economy governance, and launching pilot renewable energy projects. Priority actions include creating a Supreme Council for Sustainable Development, integrating sustainability principles into national development strategies, and initiating international technical cooperation programs.

10.2 Phase 2: Green Expansion and Economic Diversification (2028–2032)

This phase emphasizes scaling renewable energy infrastructure, expanding sustainable agriculture, developing circular economy industries, and promoting green entrepreneurship. Financial mechanisms such as green bonds and sovereign green funds should be introduced to mobilize domestic and international capital.

10.3 Phase 3: Global Competitiveness and Innovation Leadership (2032–2035)

The final phase aims to position Libya as a regional green energy hub and competitive green economy. Actions include exporting renewable electricity, developing green hydrogen projects, enhancing research and development capacity, and integrating Libya into global green value chains.

11. Extended Academic Discussion

The proposed integrated model contributes to the literature by conceptualizing green transition as a peacebuilding and competitiveness-enhancing mechanism in post-conflict states. Unlike traditional development models that treat environmental sustainability as a secondary policy objective, this study positions green transition as a core driver of institutional transformation, social cohesion, and economic diversification. The findings suggest that green transition policies can reduce conflict risks by addressing structural inequalities, generating employment opportunities, and improving governance legitimacy.

12. Implications for Sustainable Development Goals (SDGs)

The study contributes directly to SDG 7 (Affordable and Clean Energy), SDG 8 (Decent Work and Economic Growth), SDG 13 (Climate Action), and SDG 16 (Peace, Justice, and Strong Institutions). By integrating sustainability with peacebuilding and competitiveness, the proposed framework offers a comprehensive pathway for achieving the 2030 Agenda in fragile and conflict-affected contexts.

13. Extended Limitations and Future Research

This study acknowledges that the conceptual model is not empirically tested using econometric methods due to data limitations in the Libyan context. Future studies should employ panel data regression models, structural equation modeling (SEM), or system dynamics modeling to empirically validate the proposed relationships. Additionally, future research should incorporate community-level surveys to assess the social impact of green transition policies.

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