

Sustainable Development Goals in India: A Critical Assessment of Implementation Pathways in Andhra Pradesh and Telangana

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Abstract:

This study critically examines the implementation of Sustainable Development Goals (SDGs) in India, with particular emphasis on the Telugu states of Andhra Pradesh and Telangana. Despite India's commitment to achieving the 2030 Agenda, significant challenges persist in translating global frameworks into locally relevant action. Through a mixed-methods approach combining quantitative analysis of SDG India Index data (2018-2024) and qualitative assessment of policy initiatives, this research evaluates the progress, bottlenecks, and transformative potential of SDG implementation at subnational levels. The findings reveal that while both states achieved "Front Runner" status with scores of 74/100, critical gaps remain in gender equality (SDG 5), zero hunger (SDG 2), and climate action (SDG 13). The study proposes a transdisciplinary framework emphasizing bottom-up participatory governance, enhanced fiscal autonomy for local governments, and cross-scale institutional coordination. The research contributes to understanding how developing nations can balance competing socio-economic and environmental priorities while addressing regional disparities and uncertainty in resource mobilization.

Keywords: Sustainable Development Goals, SDG localization, Andhra Pradesh, Telangana, participatory governance, transdisciplinary approach, policy implementation, subnational development, India.

1. Introduction

The adoption of the Sustainable Development Goals (SDGs) by the United Nations in 2015 marked a paradigmatic shift in global development discourse, establishing an integrated framework addressing poverty, environmental sustainability, and social equity simultaneously (United Nations, 2015). India, hosting one-sixth of humanity with its 1.4 billion population, occupies a critical position in the global pursuit of the 2030 Agenda. As Prime Minister Narendra Modi articulated at the 2015 UN Summit, "Sustainable development of one-sixth of humanity will be of great consequence to the world" (NITI Aayog, 2019). However, the translation of aspirational global targets into measurable outcomes at national and subnational scales presents formidable challenges.

The complexity intensifies when examining federal structures like India, where 28 states and 9 union territories exhibit vast geographical, demographic, and socio-cultural variations (Khalid et al., 2020). This heterogeneity necessitates context-specific approaches that recognize local priorities while maintaining alignment with national and global frameworks. The Telugu states of Andhra Pradesh and Telangana offer compelling case studies for examining SDG implementation dynamics in developing contexts, particularly given their recent administrative bifurcation (2014) and subsequent divergent development trajectories.

Critical scholarship has identified three fundamental tensions in SDG implementation: the disconnect between universal targets and local realities (Weitz et al., 2018), competing interests among stakeholder cohorts (Underdal & Kim, 2017), and inadequate mechanisms for managing future uncertainties (Kwakkel & Haasnoot, 2015). These challenges are amplified in resource-constrained settings where immediate development needs often overshadow long-term sustainability considerations.

This research addresses these gaps by examining how subnational governments navigate SDG implementation amidst institutional constraints, fiscal limitations, and socio-political complexities. The study's significance extends beyond the specific geographic focus, offering insights into broader questions of global goal localization in federal developing nations.

2. Research Objectives and Questions

2.1 Primary Objectives

1. To critically assess the progress of Andhra Pradesh and Telangana toward achieving SDG targets between 2018-2024
2. To identify structural and institutional bottlenecks impeding effective SDG implementation at subnational levels
3. To evaluate the efficacy of existing governance mechanisms in translating national policies into local action
4. To develop a conceptual framework for enhancing SDG localization through transdisciplinary and participatory approaches

2.2 Research Questions

RQ1: What factors explain the differential performance of Andhra Pradesh and Telangana across various SDG indicators despite similar starting conditions post-bifurcation?

RQ2: How do institutional arrangements, fiscal autonomy, and coordination mechanisms influence the effectiveness of SDG implementation at the state and district levels?

RQ3: To what extent do current policy frameworks incorporate bottom-up participatory processes and local knowledge systems in SDG planning and monitoring?

RQ4: What role do uncertainties—financial, climatic, and political—play in constraining long-term sustainability planning, and how can adaptive governance mechanisms address these challenges?

2.3 Scope and Delimitations

This study focuses on the 2018-2024 period, utilizing NITI Aayog's SDG India Index data as the primary quantitative baseline. The geographic scope is limited to Andhra Pradesh and Telangana, selected for their recent bifurcation, comparable socio-economic profiles, and availability of disaggregated data. While all 17 SDGs are considered in the overall assessment, detailed analysis emphasizes SDGs 1 (No Poverty), 2 (Zero Hunger), 5 (Gender Equality), 7 (Affordable and Clean Energy), and 13 (Climate Action) due to their critical importance and documented performance gaps in both states.

3. Methodology

3.1 Research Design

This study employs a concurrent mixed-methods design integrating quantitative performance analysis with qualitative policy evaluation (Creswell & Plano Clark, 2018). The research is structured in three phases:

Phase 1: Quantitative Assessment

Secondary data analysis of SDG India Index scores (2018-2024) for Andhra Pradesh and

Telangana across all 17 goals. Comparative statistical analysis identifies trends, growth rates, and inter-state variations. Data sources include NITI Aayog reports, state government publications, and National Family Health Survey (NFHS) datasets.

Phase 2: Qualitative Policy Analysis

Systematic review of 47 state-level policy documents, development programs, and implementation reports. Content analysis identifies themes related to institutional coordination, fiscal mechanisms, stakeholder engagement, and adaptive planning. Documents were coded using NVivo software to identify recurring patterns and gaps.

Phase 3: Framework Development

Synthesis of findings to construct a transdisciplinary framework for SDG localization. This integrates insights from sustainability science literature, participatory governance models, and adaptive management approaches under uncertainty.

3.2 Data Collection and Analysis

Quantitative Data:

1. SDG India Index scores (2018-24) for 17 goals across both states
2. District-level performance indicators for select goals
3. Fiscal allocation data for SDG-related programs
4. Demographic and socio-economic indicators from the Census and NFHS

Qualitative Data:

1. 47 policy documents and program reports
2. 15 government schemes mapped to SDG targets
3. Case studies of implementation initiatives in agriculture, sanitation, and renewable energy

Analytical Techniques:

1. Descriptive statistics and trend analysis for quantitative data
2. Thematic content analysis for policy documents
3. Comparative case study method for implementation assessment
4. Gap analysis between policy intentions and measurable outcomes

3.3 Validation and Reliability

Triangulation across multiple data sources enhances validity. Findings were cross-verified with official government statistics, academic literature, and international development reports. The study acknowledges potential limitations in data consistency, particularly regarding district-level disaggregation and the temporal lag in certain indicators.

4. Conceptual Framework: Transdisciplinary SDG Localization

4.1 Theoretical Foundations

The conceptual framework synthesizes three theoretical streams: (1) multi-level governance theory emphasizing vertical and horizontal coordination (Meuleman & Niestroy, 2015), (2) adaptive pathways approach for managing uncertainty (Haasnoot et al., 2013), and (3) participatory downscaling of global goals through stakeholder engagement (Moallemi et al., 2019).

Key Propositions:

H1: Effective SDG implementation requires institutional structures that enable bidirectional information flow between national, state, and local levels, rather than hierarchical top-down mandates.

H2: States with greater fiscal autonomy and decentralized decision-making authority demonstrate superior performance in SDG indicators requiring context-specific interventions.

H3: Participatory processes that incorporate local knowledge and stakeholder priorities enhance the legitimacy and sustainability of development interventions.

H4: Explicit mechanisms for scenario planning and adaptive management improve resilience against future uncertainties (climatic, economic, political).

4.2 Operationalizing the Framework

The framework operationalizes through four interconnected pillars:

Pillar 1: Participatory Downscaling

Translation of national SDG targets into locally relevant indicators through multi-stakeholder workshops, ensuring alignment between global aspirations and community priorities (Jiménez-Aceituno et al., 2020).

Pillar 2: Institutional Coordination

Establishment of cross-sectoral coordinating mechanisms at state and district levels, clarifying roles and responsibilities to avoid jurisdictional overlap and fragmentation.

Pillar 3: Fiscal Autonomy and Innovation

Enhanced revenue generation capacity for subnational governments through tax reforms, combined with innovative financing mechanisms, including public-private partnerships and development impact bonds.

Pillar 4: Adaptive Governance

Integration of scenario planning, computational modelling, and iterative monitoring systems that enable course corrections in response to emerging uncertainties.

5. Findings and Critical Analysis

5.1 Comparative Performance: Andhra Pradesh and Telangana

Both states achieved identical overall scores of 74/100 in the 2023-24 SDG India Index, securing joint 9th rank nationally and "Front Runner" status (NITI Aayog, 2024). However, disaggregated analysis reveals significant intra-state variations and differential performance across specific goals.

Strengths:

1. SDG 7 (Affordable and Clean Energy): Both states achieved perfect scores (100/100), reflecting successful rural electrification and renewable energy adoption
2. SDG 6 (Clean Water and Sanitation): Telangana scored 90/100, and Andhra Pradesh 85/100, indicating substantial progress in drinking water access
3. SDG 8 (Decent Work and Economic Growth): Telangana 84/100, Andhra Pradesh 78/100, driven by employment generation schemes

Critical Gaps:

1. SDG 5 (Gender Equality): Telangana 49/100, Andhra Pradesh 52/100—lowest performers, highlighting persistent challenges in female labour force participation, sex ratio, and gender-based violence
2. SDG 2 (Zero Hunger): Telangana 58/100, Andhra Pradesh 61/100—concerning the given agricultural prominence
3. SDG 13 (Climate Action): Telangana 59/100, Andhra Pradesh 55/100—inadequate despite climate vulnerability

5.2 Structural Bottlenecks in Implementation

Institutional Fragmentation:

Multiple ministries and departments claim jurisdiction over overlapping SDG targets, resulting in duplicative efforts and coordination failures. For instance, water resource management involves at least five separate departments with unclear demarcation of responsibilities.

Fiscal Constraints:

Both states exhibit low tax-GDP ratios (Andhra Pradesh 6.2%, Telangana 6.8% in 2022-23), limiting domestic resource mobilization. Despite central transfers, inadequate funds constrain SDG-related expenditure, particularly in social sectors. Analysis reveals that actual spending on SDG-aligned programs falls short of budgetary allocations by 15-22% annually, indicating implementation capacity deficits.

Top-Down Planning:

Policy formulation remains predominantly centralized, with limited mechanisms for incorporating grassroots inputs. District and municipal authorities, closest to implementation realities, exercise minimal autonomy in adapting programs to local contexts.

Monitoring and Accountability:

While digital dashboards have been developed, they primarily track input indicators (budgets allocated, beneficiaries enrolled) rather than outcome measures (nutritional improvements, learning outcomes, emissions reductions). This creates a "reporting compliance" orientation rather than a genuine impact assessment.

5.3 Case Studies: Differential Implementation Pathways**Case 1: Rural Sanitation (SDG 6)**

Both states achieved near-universal rural sanitation coverage through the Swachh Bharat Mission. However, sustainability differs significantly. In Telangana, community-led total sanitation approaches with gram panchayat ownership demonstrated higher maintenance rates compared to Andhra Pradesh's contractor-driven model. This suggests participatory implementation enhances long-term sustainability (Panda & Mohanty, 2019).

Case 2: Agricultural Development (SDG 2)

Telangana's Rythu Bandhu scheme, providing direct cash support to farmers, contrasts with Andhra Pradesh's input subsidy approach. While both aim at farmer welfare, the cash transfer model in Telangana offers greater flexibility and reduced leakages. However, neither adequately addresses the underlying issues of soil degradation, mechanization gaps, and irrigation inadequacy identified in this research.

Case 3: Gender Equality Initiatives (SDG 5)

Despite numerous programs (Beti Bachao Beti Padhao, Mahila Shakti Kendras), both states underperform on gender indicators. Analysis reveals implementation focuses disproportionately on education enrollment rather than systemic barriers: patriarchal norms, unsafe public spaces, and discriminatory labour practices. This represents a fundamental misalignment between program design and root causes.

5.4 The Uncertainty Challenge

Climate projections for the region indicate increased temperature variability, erratic monsoons, and extreme weather events. Yet, long-term development plans inadequately incorporate climate scenarios. For instance, irrigation infrastructure investments assume historical rainfall patterns despite scientific evidence of shifting precipitation regimes. This

"predict-and-provide" approach contrasts with adaptive pathways methodology advocating flexible, scenario-robust strategies (Haasnoot et al., 2013).

Similarly, economic uncertainties—global market fluctuations, technology disruptions, demographic transitions—receive insufficient attention in planning documents. The COVID-19 pandemic starkly illustrated this vulnerability, forcing abrupt policy pivots and resource reallocations. Building institutional capacity for "decision-making under deep uncertainty" emerges as a critical requirement (Lempert, 2019).

6. Discussion: Toward Enhanced SDG Localization

6.1 Reconceptualizing Governance Architecture

Current governance structures reflect a "principal-agent" model where states implement centrally mandated programs with limited discretion. This study advocates for a "networked governance" model emphasizing horizontal collaboration, subsidiarity, and adaptive learning (Fenton & Gustafsson, 2017). Specifically:

Recommendation 1: Establish State SDG Councils with statutory authority, comprising ministers, district collectors, municipal commissioners, civil society representatives, and technical experts. These councils should possess genuine decision-making power, not merely advisory status.

Recommendation 2: Mandate SDG impact assessments for all major policy initiatives and budgetary allocations, ensuring systematic evaluation of synergies and trade-offs across goals.

Recommendation 3: Create "SDG Innovation Funds" at the state level, allocating 2-3% of development budgets for experimental pilots addressing localized challenges through unconventional approaches.

6.2 Enhancing Fiscal Autonomy

Fiscal federalism reforms must accompany governance restructuring:

Recommendation 4: Accelerate GST rationalization and expand state tax bases beyond traditional sources, potentially including carbon pricing mechanisms that generate revenues while incentivizing emissions reductions.

Recommendation 5: Develop state-specific Municipal Bonds and Green Bonds to finance SDG infrastructure, reducing dependence on central transfers and commercial borrowing.

Recommendation 6: Implement performance-linked central grants rewarding states demonstrating superior SDG outcomes, creating competitive incentives while ensuring adequacy through equalization transfers.

6.3 Participatory Mechanisms

Authentic participation transcends tokenistic consultation:

Recommendation 7: Institutionalize "SDG Citizens' Assemblies" at the district level, bringing together randomly selected residents to deliberate on development priorities and monitor implementation. Evidence from participatory budgeting experiments globally demonstrates that such mechanisms enhance accountability and citizen trust (Smajgl & Ward, 2015).

Recommendation 8: Establish dedicated platforms for integrating indigenous and traditional knowledge systems into policy formulation, particularly for SDGs 2 (agriculture), 13 (climate), and 15 (biodiversity).

Recommendation 9: Mandate annual "SDG Social Audits" conducted by civil society organizations, with findings publicly disclosed and administratively actionable.

6.4 Adaptive Planning Under Uncertainty

Recommendation 10: Develop state-level "SDG Foresight Units" employing scenario planning, computational modelling, and exploratory analysis to evaluate policy robustness across diverse futures (Moallemi et al., 2020).

Recommendation 11: Shift from static five-year plans to "adaptive pathways" frameworks that define decision triggers, monitoring signposts, and contingency responses (Haasnoot et al., 2013).

Recommendation 12: Invest in digital infrastructure enabling real-time data collection and predictive analytics, supporting evidence-based course corrections.

7. Limitations and Future Research Directions

7.1 Study Limitations

1. **Data Constraints:** Reliance on official statistics may underestimate ground realities due to measurement challenges and reporting biases. Disaggregated data at district and sub-district levels remain patchy for several indicators.
2. **Temporal Scope:** The 2018-2024 timeframe, while recent, may not capture longer-term trends or lagged effects of policy interventions.
3. **Geographic Focus:** Findings specific to Andhra Pradesh and Telangana may not generalize to states with different socio-political contexts, governance traditions, or resource endowments.
4. **Methodological:** The study relies primarily on secondary data and document analysis. Primary fieldwork incorporating stakeholder interviews and community perspectives would enrich understanding of implementation dynamics.

7.2 Future Research Agenda

1. **Longitudinal Impact Studies:** Rigorous evaluations employing quasi-experimental designs to establish causal relationships between specific interventions and SDG outcomes.
2. **Behavioural Dimensions:** Investigation of cognitive, cultural, and social factors influencing policy adoption and implementation effectiveness, drawing on behavioural economics and social psychology.
3. **Technology and Innovation:** Assessment of how digital technologies, artificial intelligence, and data analytics can enhance SDG monitoring, predictive modelling, and adaptive governance.
4. **Comparative Federalism:** Cross-national studies examining how different federal structures (cooperative vs. competitive federalism) shape SDG implementation pathways.
5. **Trade-offs and Synergies:** Quantitative modelling of interdependencies among SDGs to identify optimal policy bundles that maximize co-benefits while minimizing trade-offs (Weitz et al., 2018).

8. Conclusion

This study's critical examination of SDG implementation in Andhra Pradesh and Telangana reveals a fundamental tension: while both states have achieved commendable progress on certain indicators, systemic gaps persist in governance architecture, fiscal autonomy, participatory mechanisms, and adaptive capacity. The "**Front Runner**" designation masks significant variations across goals, with persistent underperformance in gender equality,

nutrition security, and climate action—precisely the areas requiring transformative rather than incremental change.

Three overarching insights emerge. First, the current top-down, compliance-oriented approach inadequately addresses context-specific challenges and local priorities. Genuine localization demands institutional restructuring enabling bottom-up innovation and horizontal collaboration. Second, fiscal constraints represent not merely technical challenges but political economy questions about revenue generation, expenditure prioritization, and intergovernmental fiscal relations. Addressing these requires confronting vested interests and negotiating new federalism compacts. Third, the assumption of linear progress toward fixed targets proves increasingly untenable given accelerating environmental, technological, and socio-economic changes. Adaptive governance frameworks that embrace uncertainty and build resilience emerge as essential.

The study's transdisciplinary framework offers a roadmap for enhanced SDG localization, integrating participatory downscaling, institutional coordination, fiscal innovation, and adaptive planning. However, translating this conceptual model into practice demands political will, bureaucratic capacity, and sustained citizen engagement—preconditions that cannot be assumed but must be actively cultivated.

India's success in achieving the 2030 Agenda holds global significance, given the country's demographic weight and development aspirations. Yet, success requires moving beyond rhetorical commitments and reporting compliance toward genuine transformation of development paradigms. This entails recognizing SDGs not as externally-imposed obligations but as frameworks for advancing indigenous visions of sustainable and equitable prosperity. The Telugu states, with their distinctive challenges and opportunities, exemplify both the promise and complexity of this endeavour. Whether India's SDG journey culminates in substantive transformation or incremental tinkering will depend on choices made today regarding governance, investment, and collective will.

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