What leads China's climate governance strategy: environment, development or risk management?

Evidence from a Decade of Policy Analysis in Shenzhen

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Why did China reverse its climate positions?

1997: Common but differentiated responsibility

2009: CO_2 intensity down by 40~45% in 2020 from 2005 level

2014: CO_2 emissions peaking around 2030

2017: The U.S. withdrew from the Paris Agreement

2020: Carbon neutrality by 2060

2025: The U.S. withdrew from the Paris Agreement again

Alternative climate governance strategies

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Climate policies:

- ✓ **Development**: Industrial restructuring and upgrading, technological innovation, green energy, energy efficiency, green economy.
- ✓ **Environment**: Ecological restoration, biodiversity conservation, pollution control, carbon sink, urban greening, carbon trading and market, water resource management.
- ✓ **Risk Management**: Climate resilience, disaster prevention, adaptive planning, climate health.

Ministries for climate governance

- National Development and Reform Commission (NDRC)
- Ministry of Environmental Protection →
  Ministry of Ecology and Environment (MEE) (2018)
- Ministry of Emergency Management

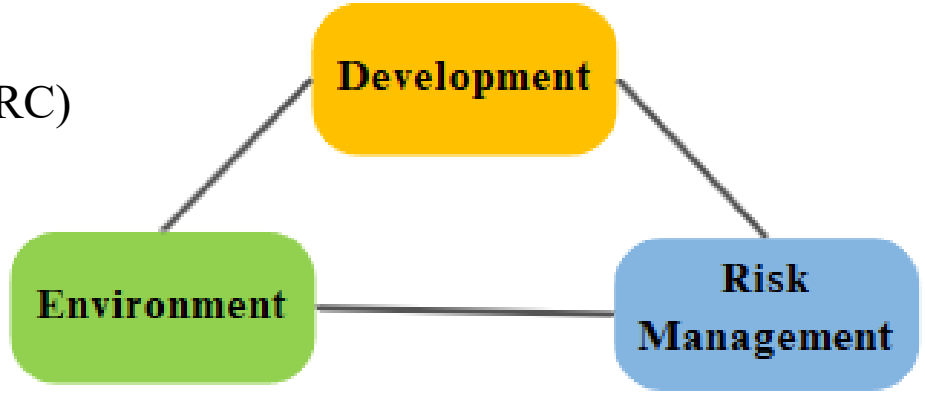

Figure 1. Policy Focus Triangle.

Research Questions

Case Study: Shenzhen

- ✓ First Special Economic Zone and pilot city for low-carbon initiatives.
- ✓ Experimental governance culture and high relevance to national and international climate agendas.
- ✓ Climate-related challenges: urban heat island effect, typhoon risks, water scarcity.

Research Questions

- **RQ1:** How has Shenzhen prioritized Development, Environment, and Risk Management within its climate governance from 2015–2024?
- **RQ2:** How do policy contents and inter-agency collaborations reflect the underlying strategic orientations and their evolution?
- **RQ3:** What role did the 2018 institutional reform play in reshaping (or reinforcing) Shenzhen's climate governance priorities?

Data and Methodology

Data Collection and Processing

- 2,245 municipal climate-related documents (2015–2024) retrieved from the PKU Law Database.
  - ✓ **Policy types:** Administrative regulations, guidelines, development plans, implementation rules.
  - ✓ 176 jointly issued and 2,069 individually issued policies.
- **Data curation:**
  - ✓ Removal of irrelevant records (e.g., personnel notices).
  - ✓ Standardized text preprocessing (De-duplication, tokenization, stopword filtering, normalization).

Mixed-Methods Analytical Strategy

- **Text Analysis - Latent Dirichlet Allocation (LDA):**
  - ✓ To extract **thematic structures and policy focuses**.
  - ✓ Optimized based on coherence and perplexity metrics.
- **Network Analysis - Social Network Analysis (SNA):**
  - ✓ To map **inter-departmental collaboration patterns**.
  - ✓ Calculated degree, closeness, and betweenness centralities.
- **Temporal Analysis - Interrupted Time Series (ITS) and Chow Test:**
  - ✓ To evaluate the **structural effects** of the 2018 institutional reform on policy outputs.

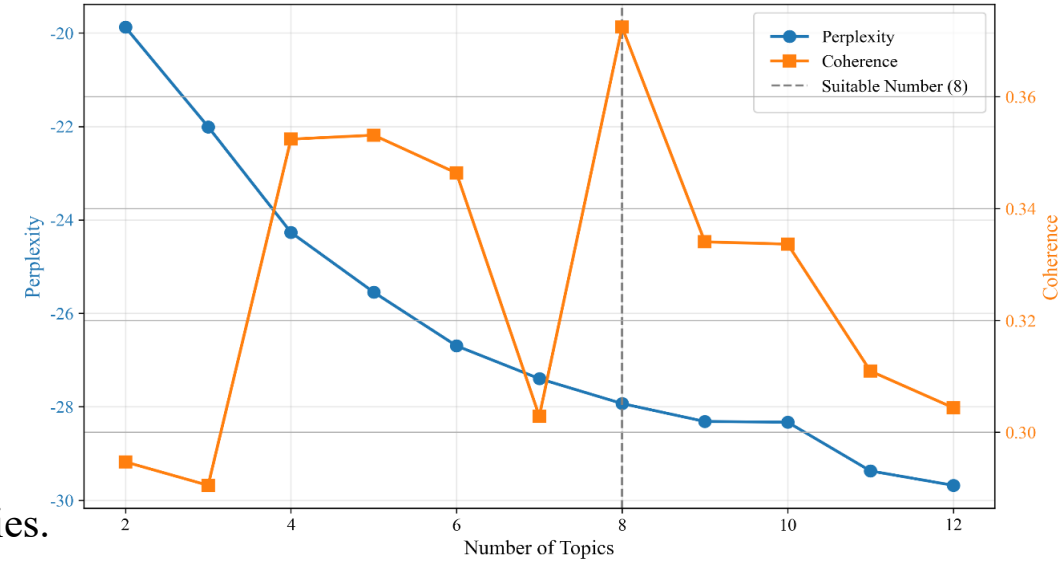

Figure 2. Optimized Theme Number, k=8.

Finding 1. Thematic Structure

Topics were grouped into three strategic categories:

Development-oriented (T4, T5, T6): ~ 70%

Environment-oriented (T1, T3, T7): ~15%

Risk Management (T2, T8): ~15%

Topic 4 had the highest overall intensity (0.3656), representing industrial and technological growth.

The word cloud reinforces the development logic: frequent keywords include technology, industry, green finance, and intellectual property.

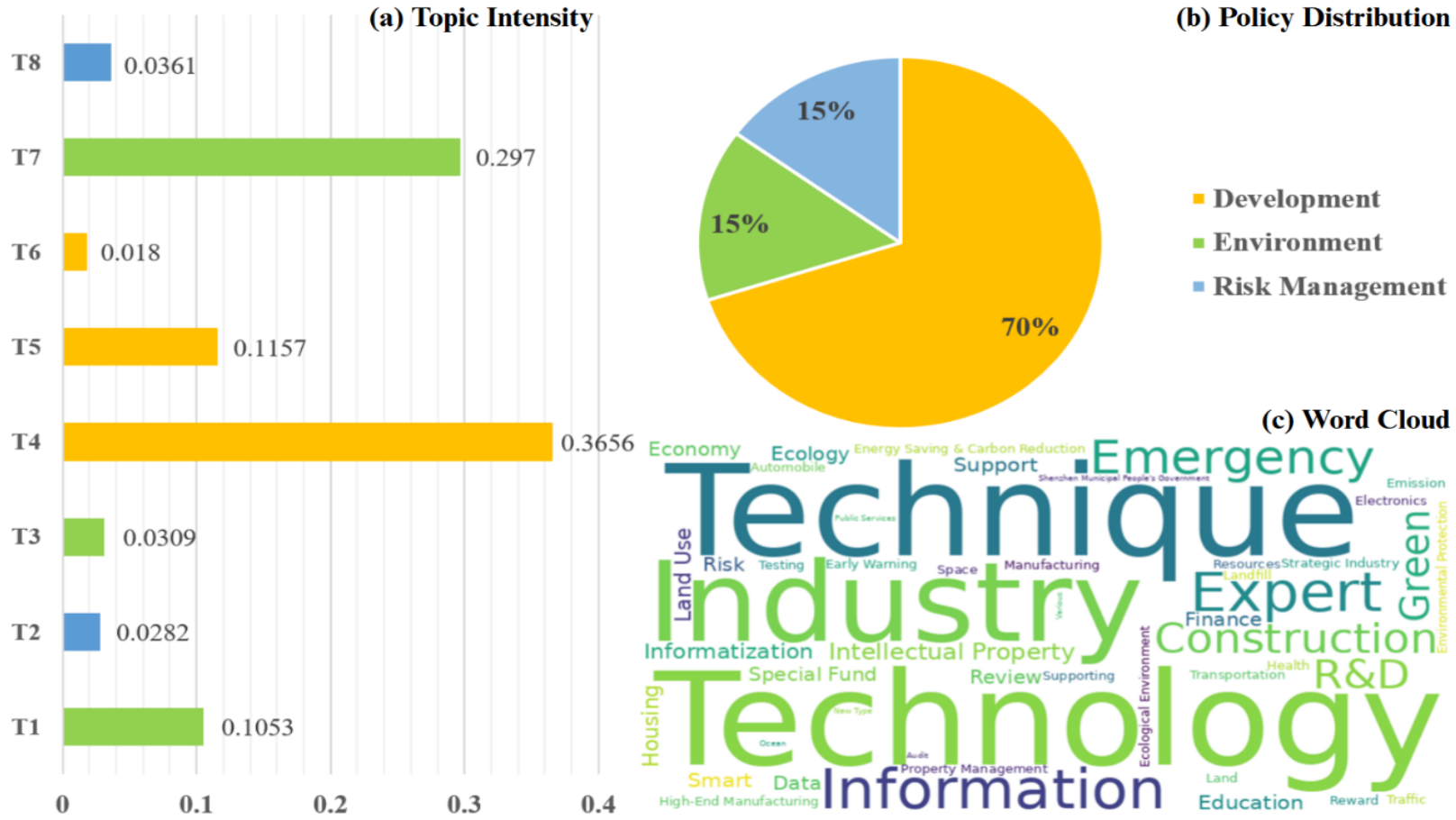

Figure 3. Policy Topic Intensity & Distribution.

Finding 2. Institutional Structure

- **Top five issuers:** Industry and Information Technology Bureau (IITB), Development and Reform Commission (DRC), Science and Technology Innovation Commission (STIC), Finance Bureau, Housing Bureau.
- Development-related agencies dominate in both:
  - ✓ Volume of policy issuance.
  - ✓ Network centrality (degree, betweenness, closeness metrics) (→ Next Page).

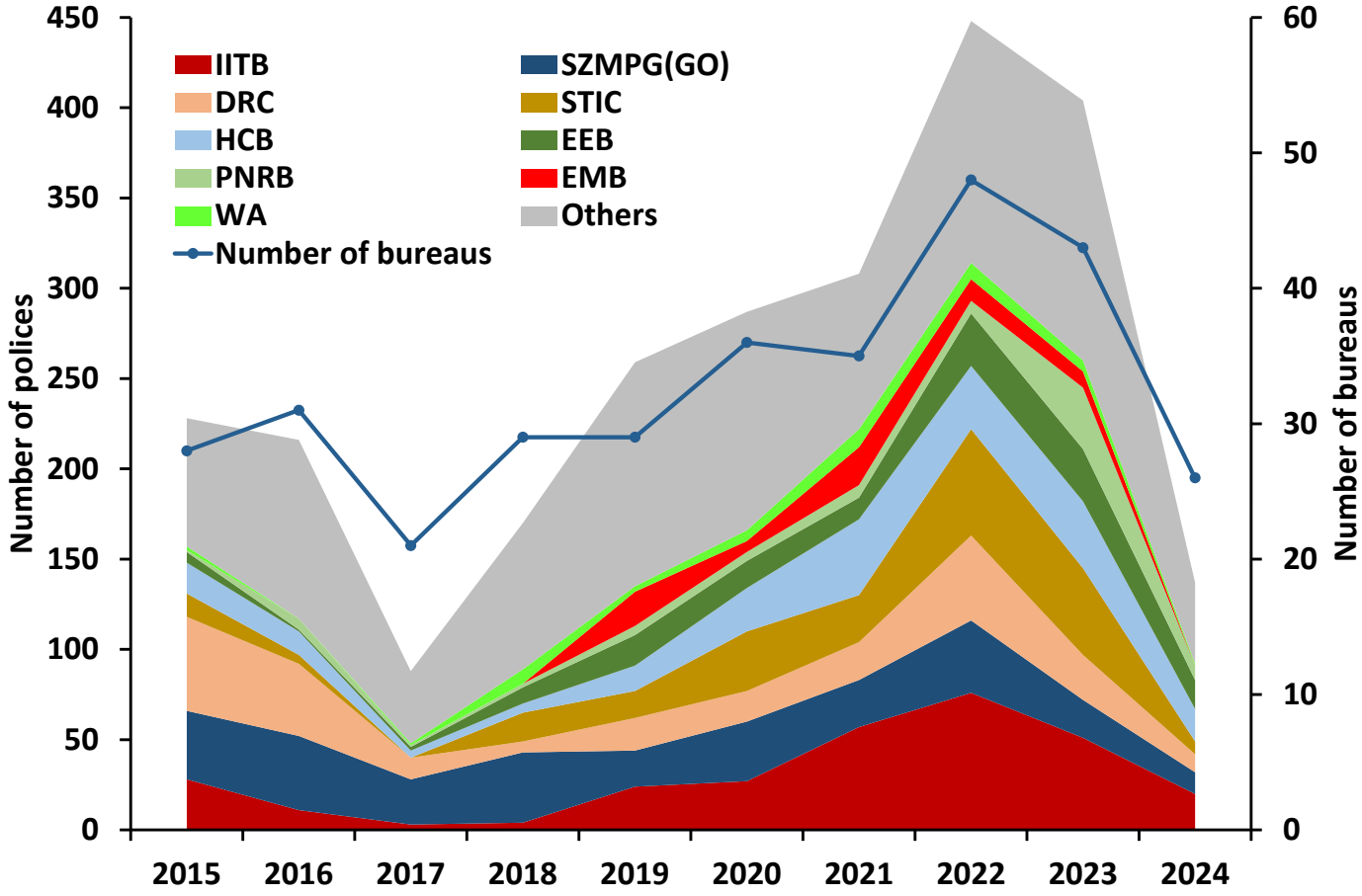

Figure 4. Documents Published by Main Institutions

Finding 2. Institutional Structure

Background & Questions

Data and Methodology

Empirical Findings

Conclusions

SNA results confirm institutional dominance of **development-focused agencies.**

→ Network graph showing inter-agency collaborations on 176 co-issued climate-related policies.

→ **Nodes**: individual departments (e.g., DRC, IITB, STIC, EEB, EMB, FSAB).

→ **Edges**: co-issuance relationships; thicker lines = higher frequency.

Core nodes (high degree centrality):
DRC, **IITB**, **STIC**, **FB** – all **development-related departments**

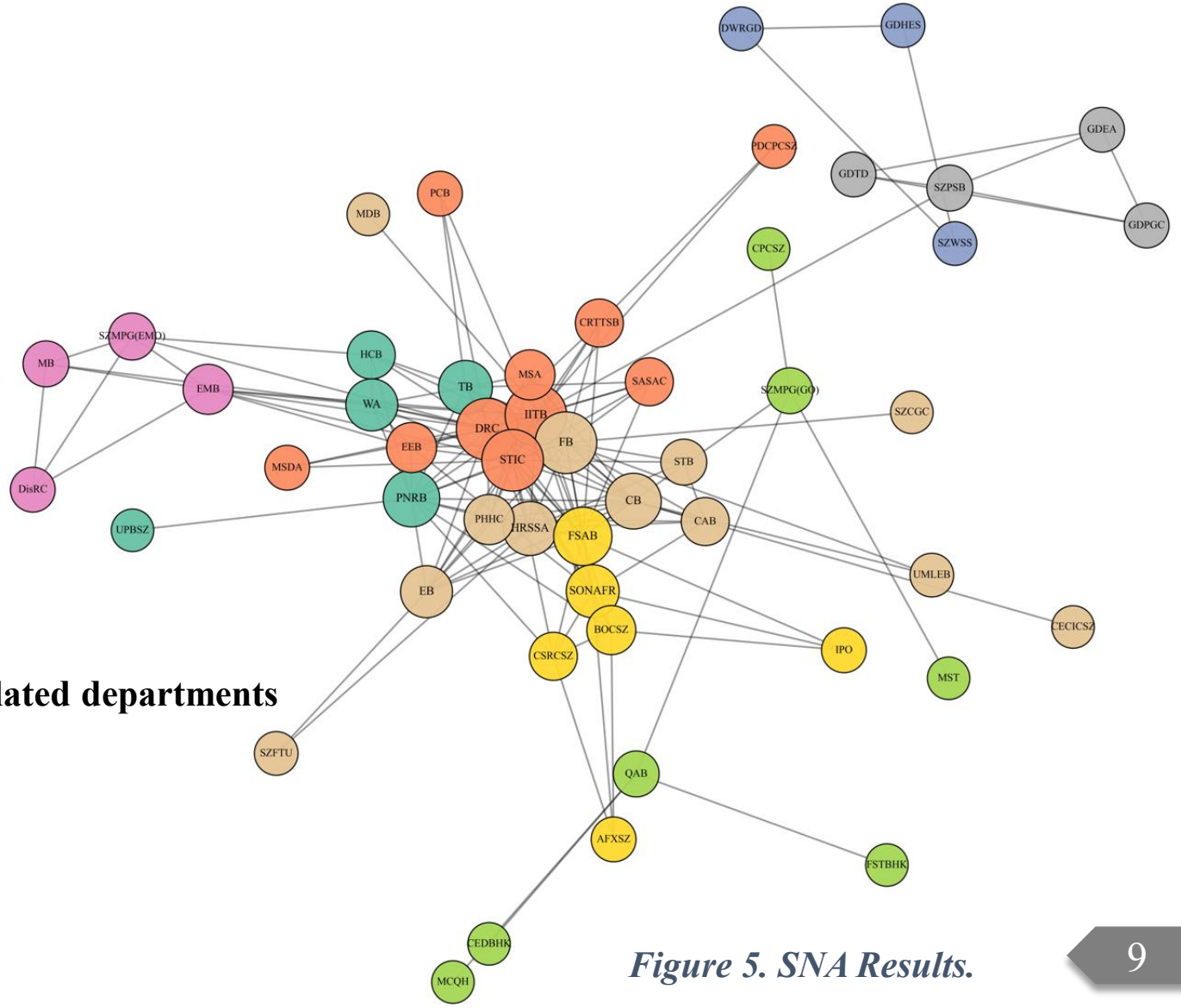

Figure 5. SNA Results.

Finding 3. Reform Effects

2018 reform transferred climate responsibility from DRC to EEB.

- Development-related policies showed significant growth post-reform.
- Environmental and risk-related policies showed limited change.

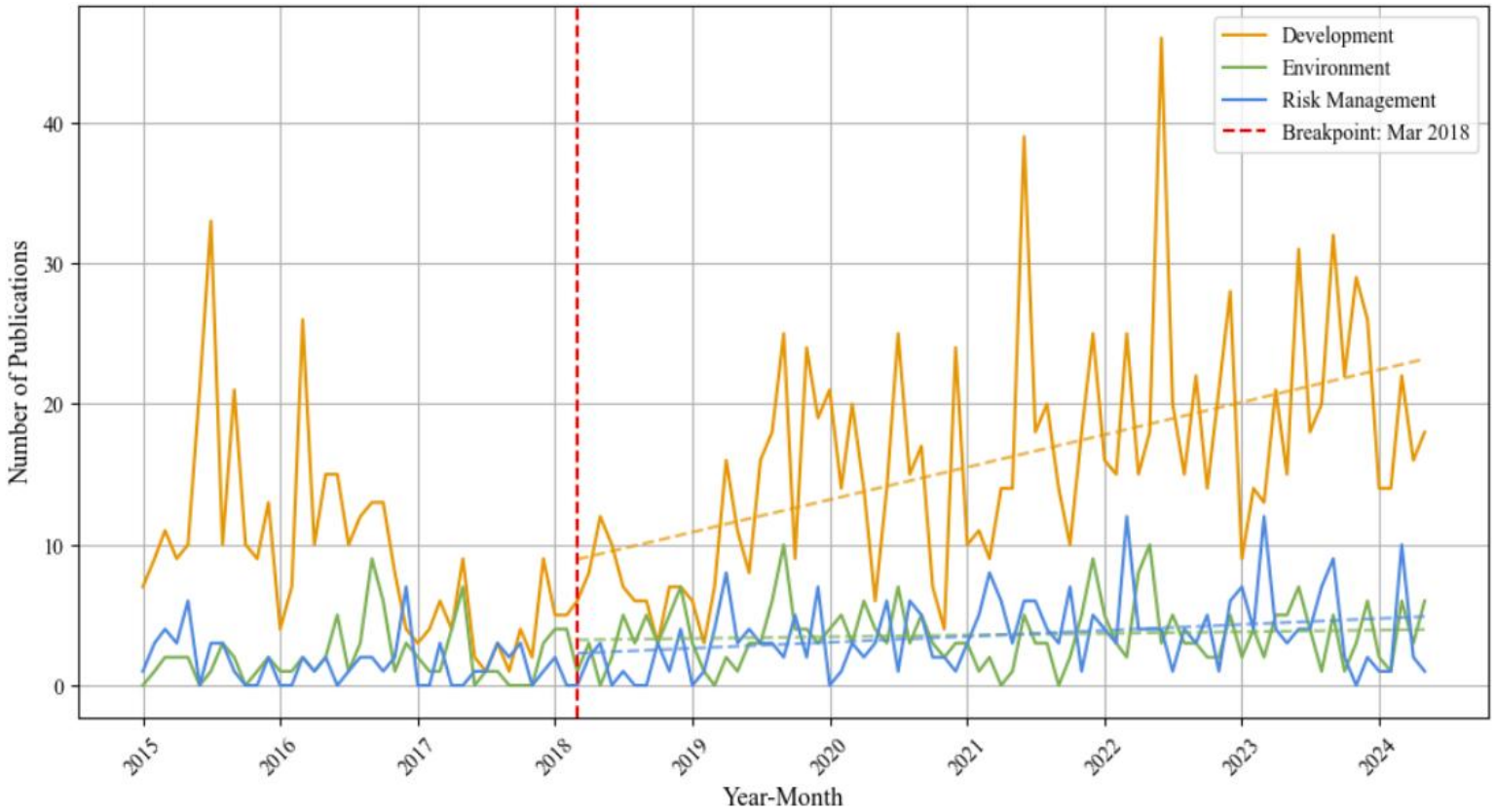

Figure 6. Trend Visualization with Breakpoint.

Finding 3. Reform Effects

- **ITS Regression:**
  - ✓ Only development-related policies showed significant post-reform growth
  - ✓ Environmental & risk-related policy trends remained stable or grew only modestly

→ Reform reallocated authority but did not rebalance strategic priorities.

Table 1. ITS Results.

Variables	Development	Environment	Risk Management
β_0 (Baseline Level)	15.4410*** (2.105)	1.5513** (0.677)	2.2359** (0.733)
β_1 (Pre-reform Trend)	-0.3215** (0.095)	0.0263 (0.031)	-0.0340 (0.033)
β_2 (Level Change)	-13.4985*** (3.552)	1.5237 (1.142)	-1.0707 (1.236)
β_3 (Slope Change)	0.5105*** (0.102)	- 0.0189 (0.033)	0.0667* (0.036)
R-squared	0.374	0.121	0.201
Adjusted R-squared	0.357	0.096	0.179
Observations (N)	113	113	113

*Note: Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.001$.*

- **Chow test:**
  - ✓ Significant structural break only for Development category ($F=13.00$, $p<0.001$).

Table 2. Chow Test Results.

Variables	F Statistic	p-value
Development	13.004131	0.000009
Environment	1.595883	0.207429
Risk Management	1.684292	0.190369

Conclusion

Urban climate governance in China: environment sets the vision, development provides the engine, and risk management ensures resilience.

The major reform in 2018 to reassign climate change from development-focused NDRC (National Development and Reform Commission) to environment-focused MEE (Ministry of Ecology and Environment) did not shift the development-oriented climate governance strategy.

Shenzhen illustrates a hybrid, development-led but environmentally legitimated model

→ In rapidly developing countries, development-driven climate policy may **accelerate innovation** and **turn climate threats into economic opportunities.**

→ The Shenzhen model offers lessons on how to **align climate mandates with local capacity and priorities**

Thank You!

We welcome your questions and feedback.

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