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Principles and Methodologies for STI Strategy Development: Experiences and Best Practices from Republic of Korea

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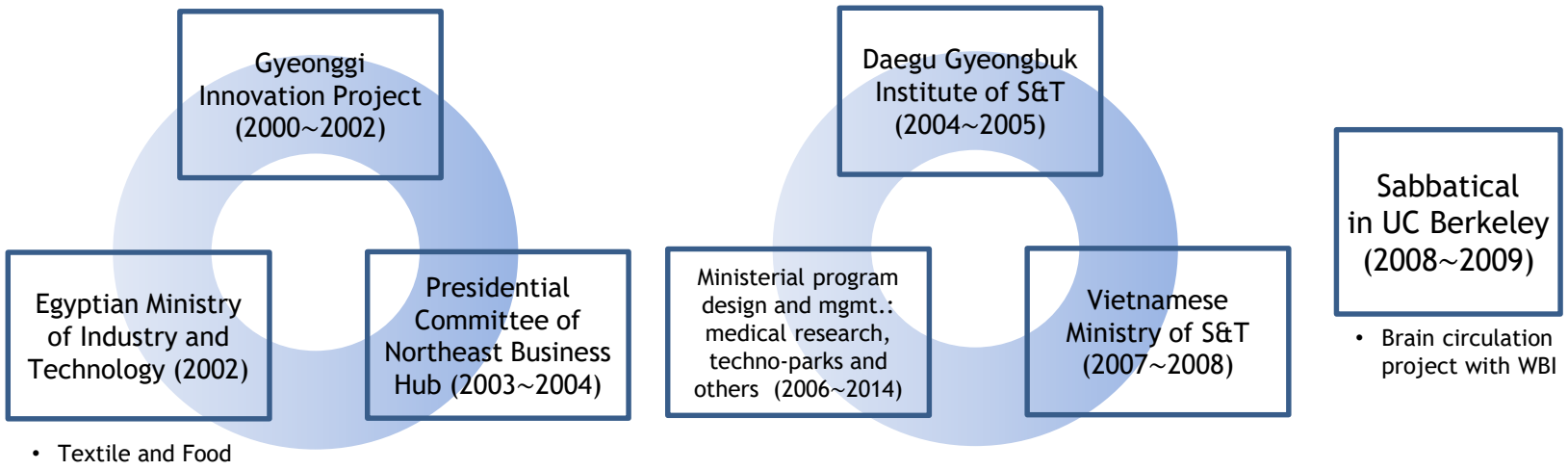
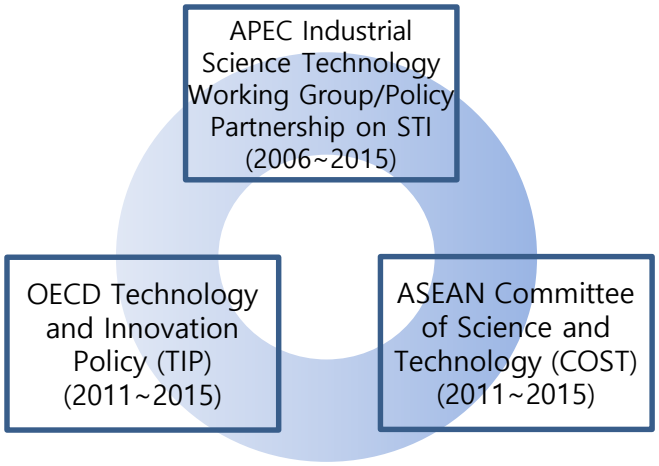
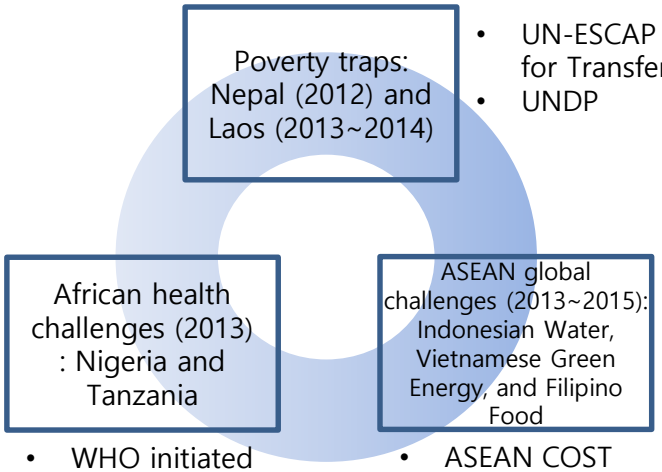
Prologue



- Korea Information Society Development Institute (1994 ~1996)
- The Institute for Korean Regional Studies, Seoul National University (1998 ~2000)
- Planning and Administration Director, STEPI(2010 ~2011)





- UN-ESCAP Asian and Pacific Centre for Transfer of Technology (APCTT)
- UNDP
- WHO initiated African Network for Drugs and Diagnostics Innovation (ANDI)
- ASEAN COST

- Feasibility Study on Establishing Special Economic Zones in Uzbekistan (2007 ~2008)
- Guidelines for a KIST-Modeled S&T Institute in Vietnam (2012)

1. Benchmarking Process and Components: Vision, Driving Mechanism and Implementation

- Rush to Benchmark Korean Experiences without Contextualized Understanding
  - Globally acknowledged approaches of benchmarking and global standard are not relevant.
- Current benchmarking practices
  - Normal benchmarking process: identifying own problems for benchmarking, surveying and visiting best practices and articulating new practices for implementation
  - OECD's benchmarking practices: comparing target countries' performance with that of other (OECD) countries by innovation system component and recommending to increase above the average if they are below average and to implement a certain policy practices of other better performing countries.
  - These types of benchmarking are lacking a longitudinal approach by which specific solutions are articulated to solve identified problems and do not tell how to design and implement relevant programs.

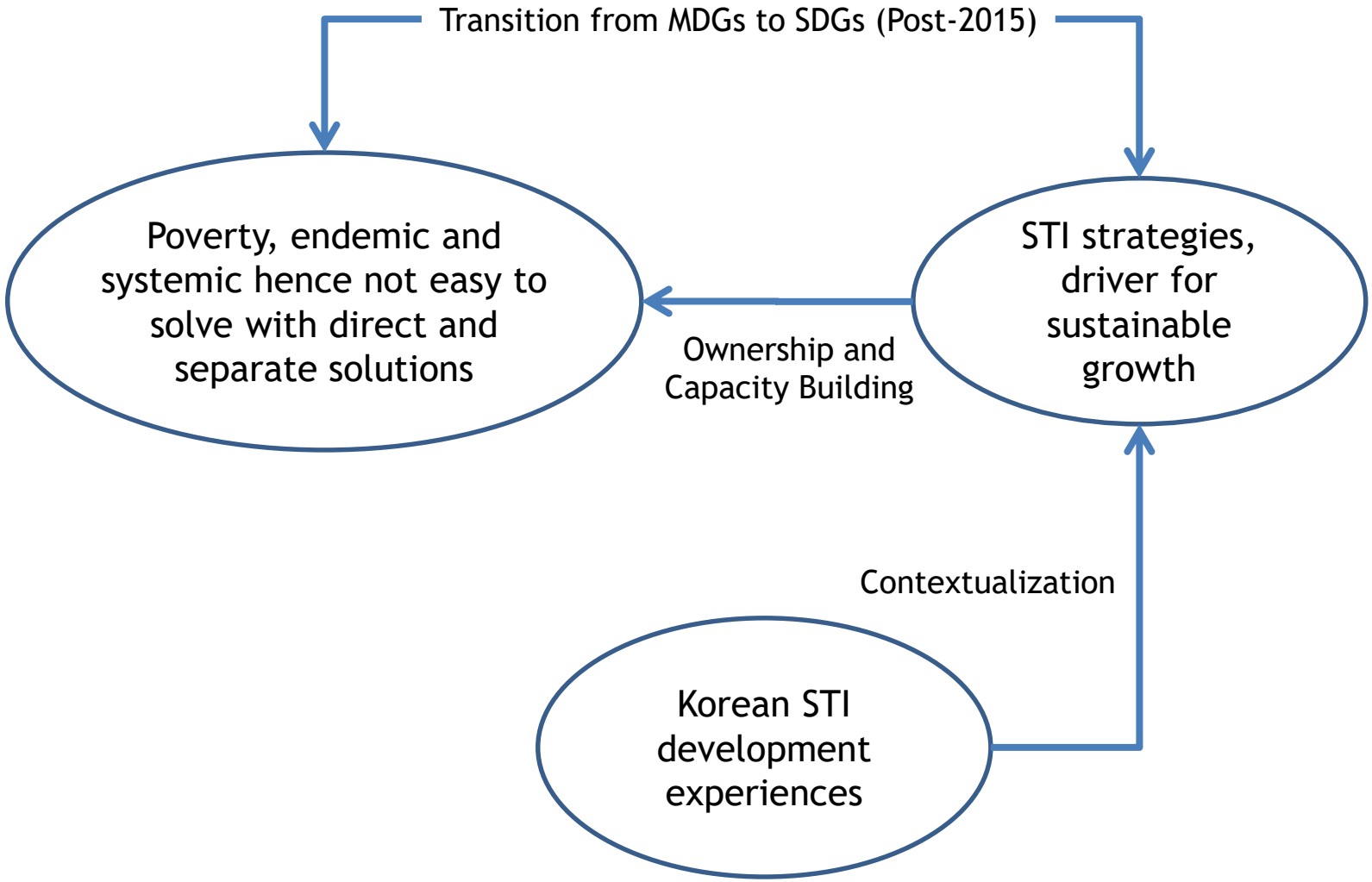
- Need to Develop New Approaches for Diagnosis and Strategy Development
- Pilot STI Strategies Development and Extension to Other Countries

  - Poverty Traps: Nepal (2012), Laos (2013-2014)

  - African Health Challenges: Nigeria (2013), Tanzania (2013)

  - ASEAN Global Challenges (2013-2014): Indonesian Water, Vietnamese Green Energy, and Filipino Food

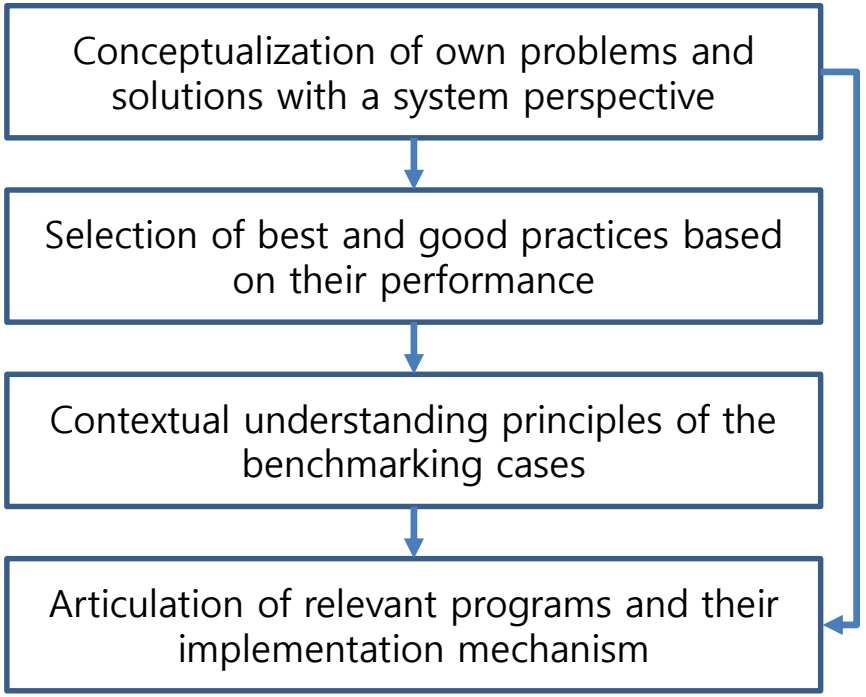
- Iterative Process for Multilateral and Bilateral STI Strategy Development with Selected Cases


Transition from MDGs to SDGs (Post-2015)
Poverty, endemic and systemic hence not easy to solve with direct and separate solutions
STI strategies, driver for sustainable growth
Ownership and Capacity Building
Contextualization
Korean STI development experiences

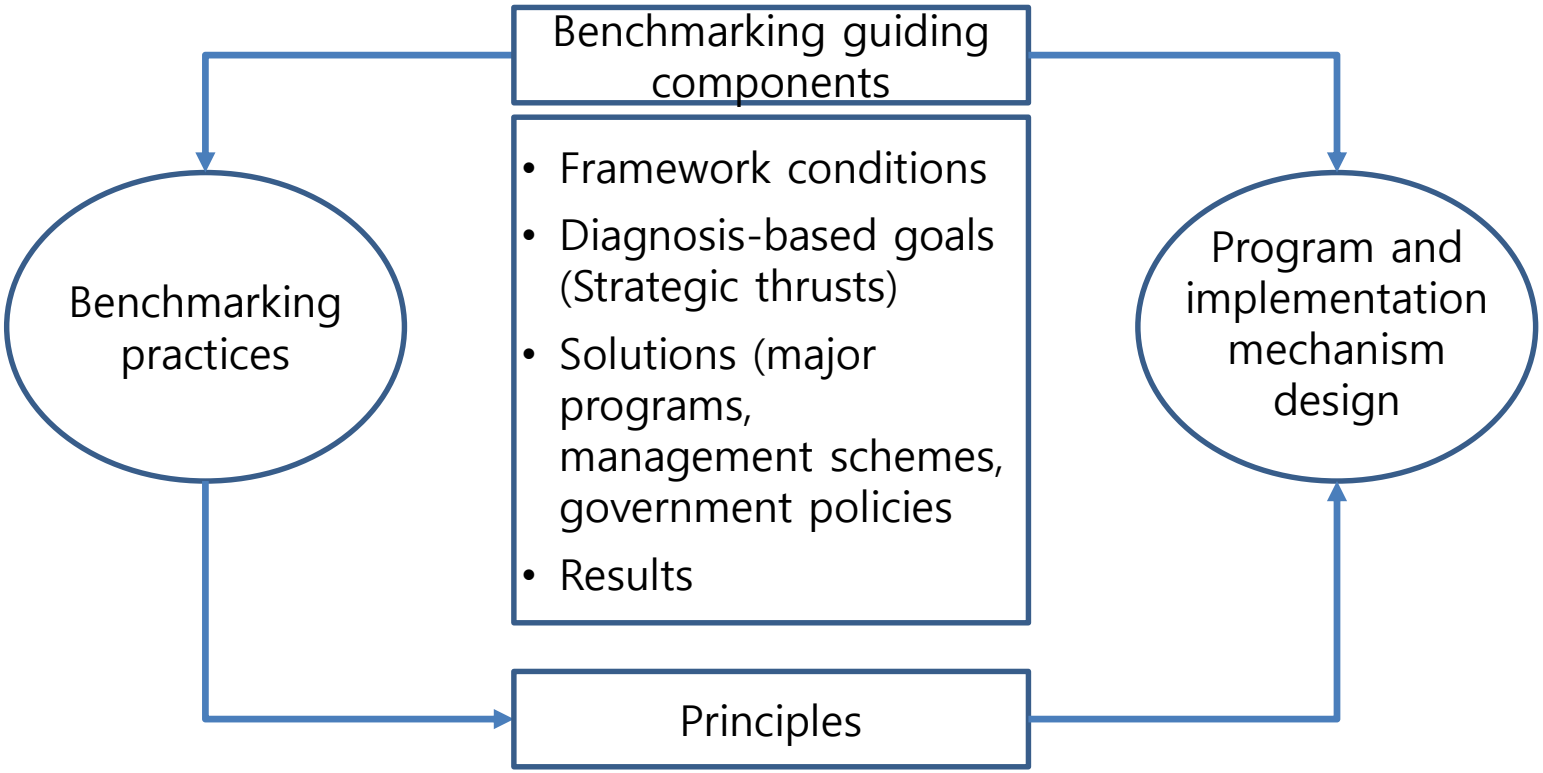
- Vague and irrelevant futuristic vision
  - "Wish list" of Post-2015, STI just addressing socio-economic and global challenges, etc
  - Individual country vision irrelevant for APEC region
  - ERA as a more specific vision for scale economy to compete with USA and China
- Absence of driving mechanism
  - No coordination mechanism for various stakeholders of nations, regions, individual STI actors to work together to achieve collective goals
  - Smart specialisation conceptually designed for a driving mechanism
- Poor implementation
  - Lack of longitudinal approaches and prevalence of benchmarking practices leading to intrinsic conflicts of implementation
  - Once implemented, specific programs/projects are not relevant, coherent or consistent to achieve goals especially bottom-up competition processes.

Benchmarking process

- Benchmarking after conceptualizing problems and solutions
- Best and good practices cannot be copied but their principles can be transplanted.
- The principles can be used to design programs and their implementation mechanism.



Benchmarking framework



2. Korean STI Development Experiences

❑ Export Promotion in 1960s

	1960s
Framework Conditions	No natural resources/poor domestic market and no FDI/only diligent, cheap and well motivated human resources
Diagnosis- Based Goal	Export promotion
Solutions	Vocational training system (1967) and macro-economic institutional settings such as currency rate manipulation, bank loan, etc to boost export promotion
Results	Dramatic increase of export from USD100 million in 1960 to USD 363.5 billion in 2010

- Export promotion policy may function as a kind of structural capacity for industry to expand further innovation investment in the next development phase.
- In the second half of 1960s, legal and administrative frameworks were institutionalized by establishing KIST (1966), MOST (1967), S&T Law (1967), and Long-term Master Plan for S&T Development.

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❑ GRIs: Technology Windows in 1970s

	1970s
Framework Conditions	• Structural weakness of export promotion of a labor intensive industry for sustaining industrial competitiveness with shrinking overseas assistance
Diagnosis-Based Goal	• Promotion of six heavy and chemical industries but absence of technology, human resources and investment funding for industrial deepening
Solutions	• Creation of government research institutes (GRIs) and repatriation of overseas Korean researchers and engineers for technology absorption and dissemination from overseas to domestic private sectors. • Project-based operational models of GRIs to activate close relationship with private sectors • Cultivation of high caliber engineers through establishment of KAIST. • Strong government engagement and financing schemes to invest in the major strategic industries including financial compensation.
Results	• In 2010, Korea's POSCO was ranked as the world's #1 steel and iron company, automotive industry was ranked fifth worldwide, petrochemicals comprised 7.6% of exports, machinery occupied 7.7% of exports and electronics totaled 25.1% of its exports.

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❑ Research Consortium: Risk Sharing in 1980s

	1980s
Framework Conditions	Technology protectionism after oil crisis of late 1970s/wide recognition of R&D investment for private companies competitiveness
Diagnosis-Based Goal	Promotion of private R&D investment and technology drive of government
Solutions	Research consortium of private companies, GRIs and universities by national R&D program (1982), Information & Communication Technology Program (1988) Private R&D Promotion Schemes; R&D Tax Support (1981), Private Research Center Certification (1982), Tariffs Reduce on Research Materials (1983)
Results	Less than 20% R&D investment from private sector in 1980 to more than 80% in 1990 In 2010, Semi-conductor comprised 11% of exports/Display 6.4% of exports /Mobile phones 5.9% of exports

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❑ Technology Extension in 1990s and 2000s

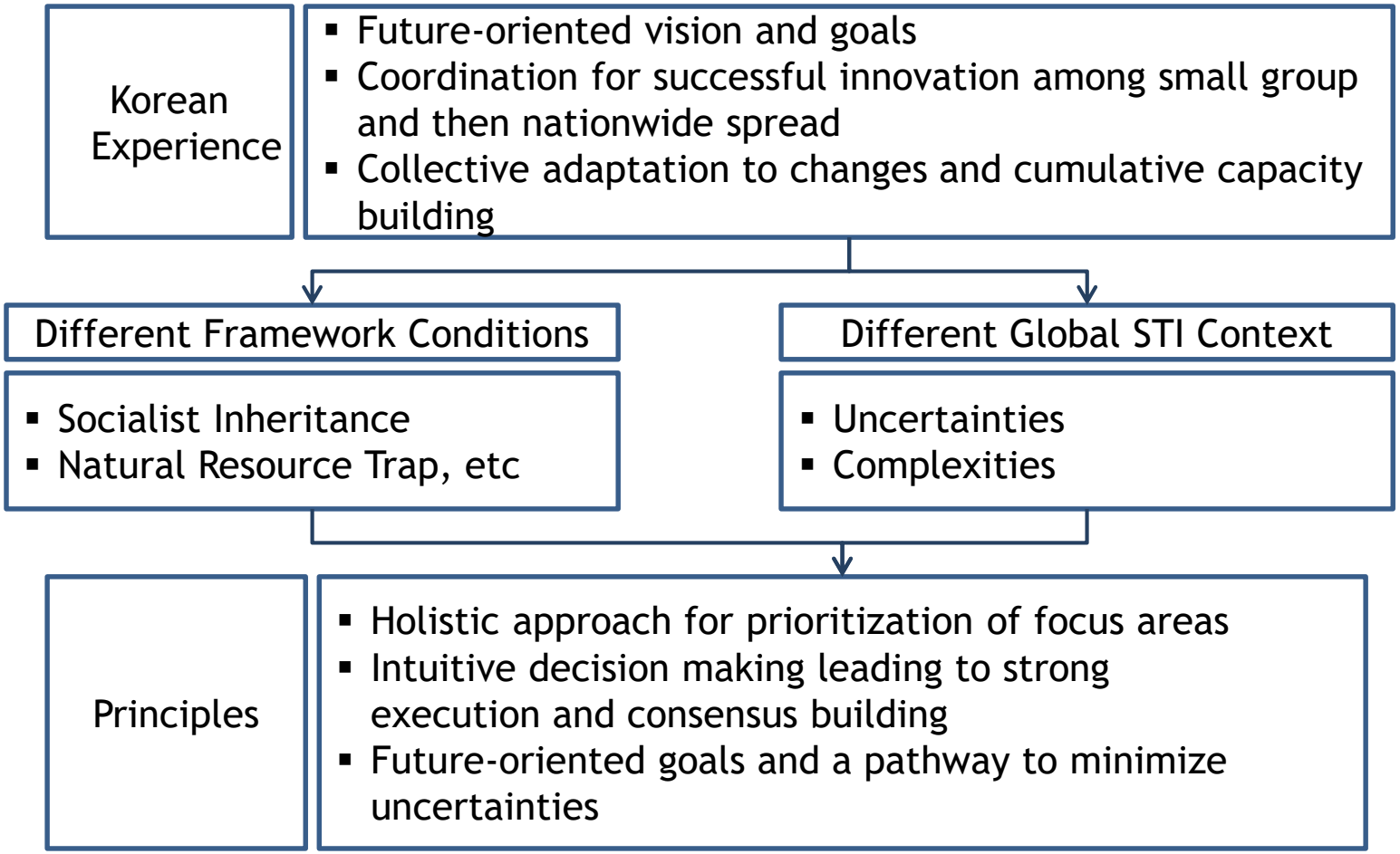
	1990s
Framework Conditions	Economic development driven by innovation from investment-driven and local extension of supply chains
Diagnosis-Based Goal	Promotion of university research and linkage of university-industry-government research institutes
Solutions	Expansion of National R&D programs through Highly Advanced National Project (1992) Creation of University R&D programs such as Science Research Center (1992), Engineering Research Center (1992), The Creative Research Initiative (1997), The National Research Laboratory (1999), etc Cultivation of Research Management and Evaluation System through National Science and Technology Council (1991) and Research Council System (1998)
Results	Increase of PhD graduates from 3,503 (1981) to 76,480 (2009), US patents from 236 (1981) to 23,584 (2008) and SCI articles from 17 (1981) to 7,548 (2008)

Structural capacities are to be designed for efficient and effective utilization of limited resources to trigger a virtuous circle of science and industry relations in a premature development phase as identified in Korean experiences:

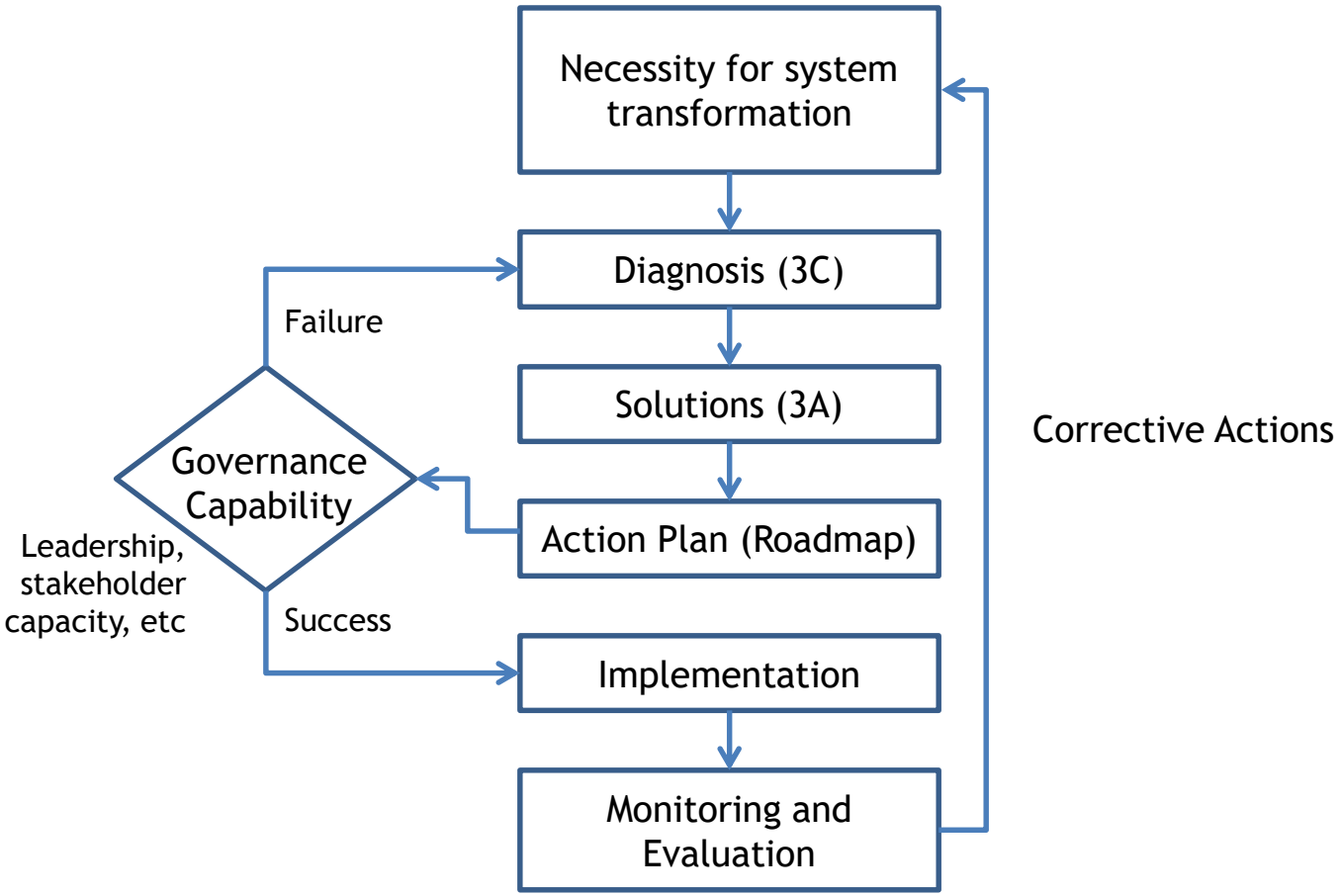
- Identification of goals: export promotion in 1960s, heavy and chemical industrial promotion in 1970s, and promotion of private R&D investment
- Appropriate organizational arrangement: government research institute for mission research in 1970, research consortiums in 1980s
- Operation model: project-based operation model of GRIs in 1970s, research management and evaluation system in mid-1990s
- Governing mechanism: top-down and hierarchical process of decision-making and implementation in 1970s and 1980s, sophisticated inter-ministerial coordination only in 2000s
- Legal and macro-institutional framework: macro-economic management and financial support and bank loan assistance for export promotion in 1960s, various laws, plans and programs in 1970s,1980s

3. Methodologies for Diagnoses and Solution Articulation

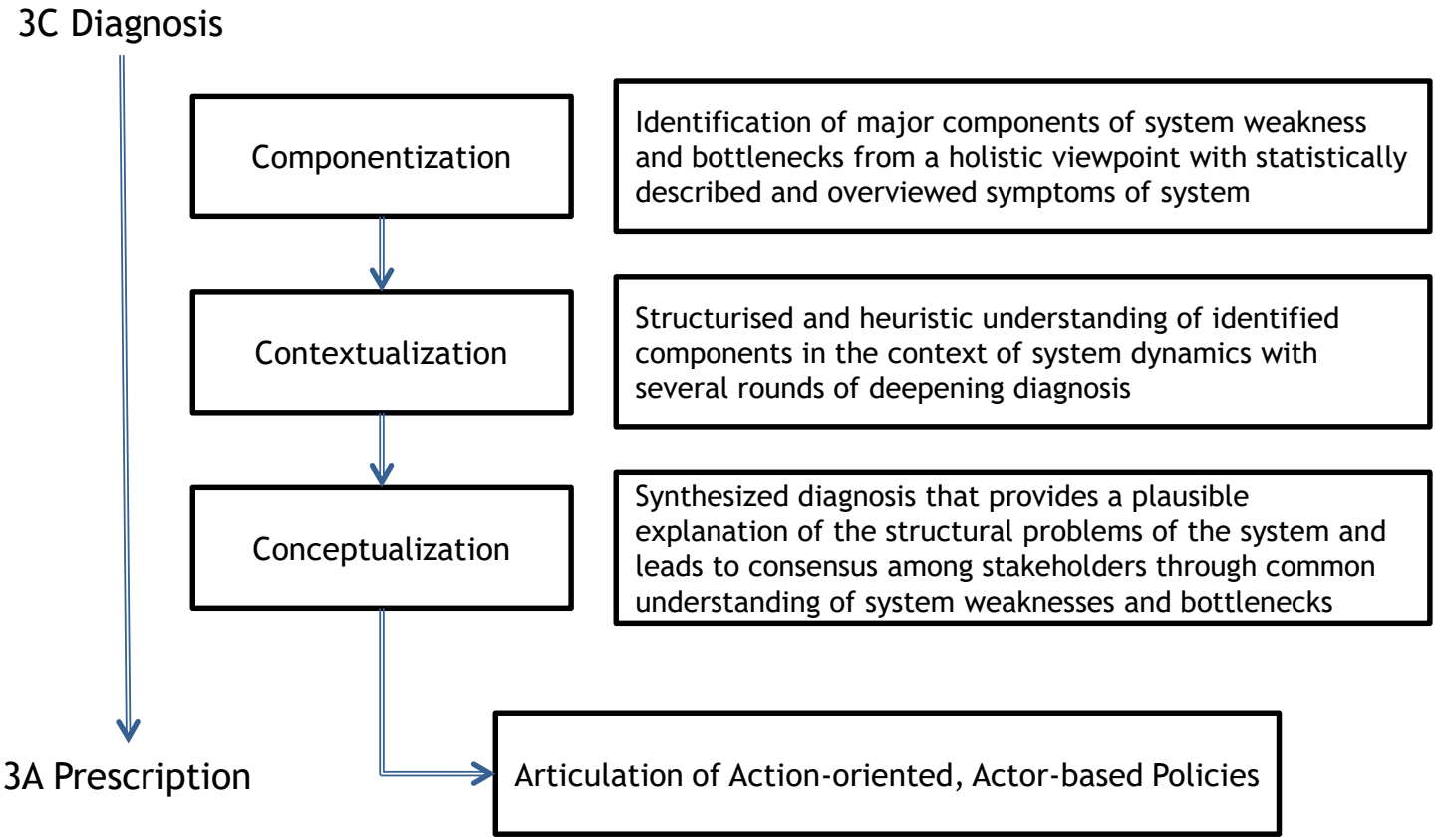
- STI strategy development principles



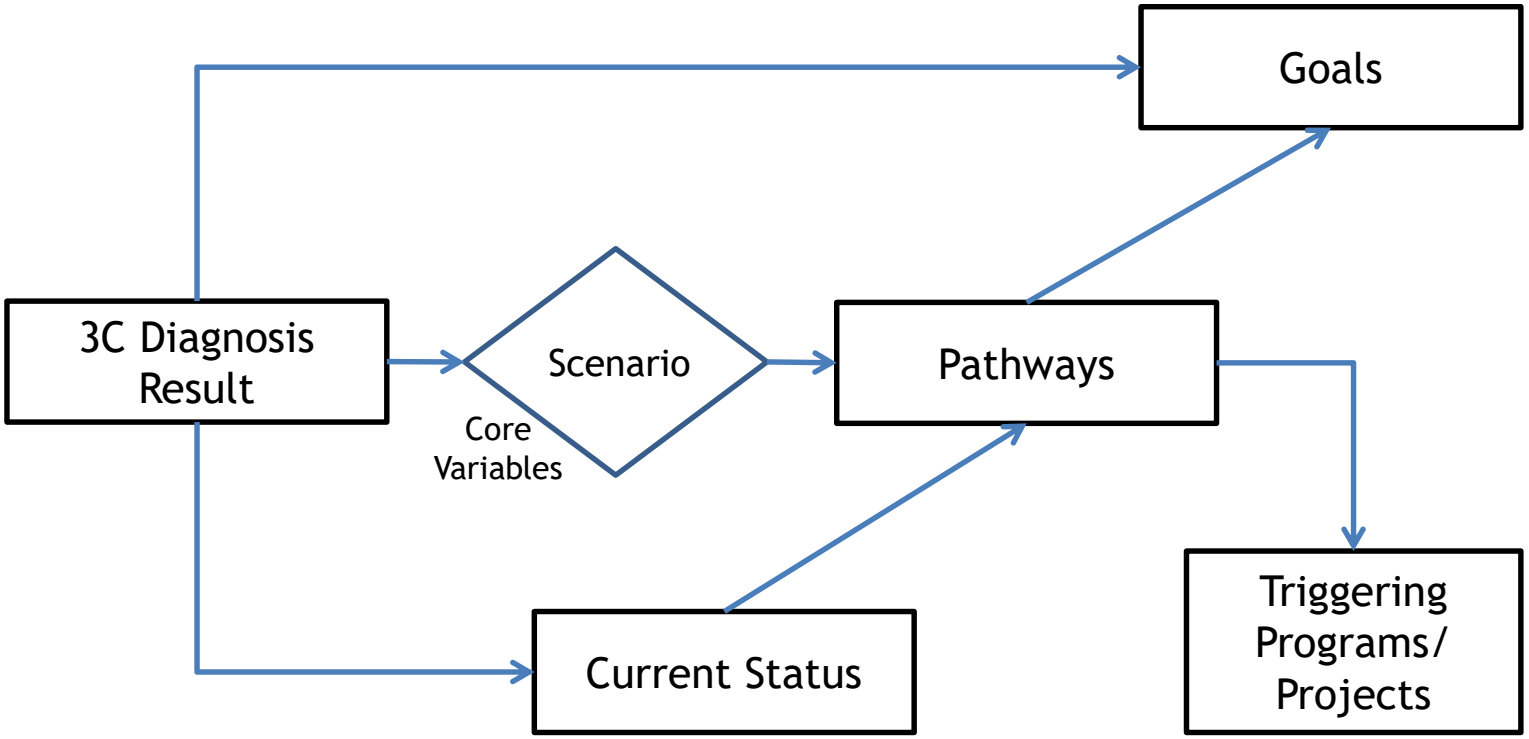
- Strategy Simulation



- Holistic Approach: 3C Diagnosis and 3A Prescription



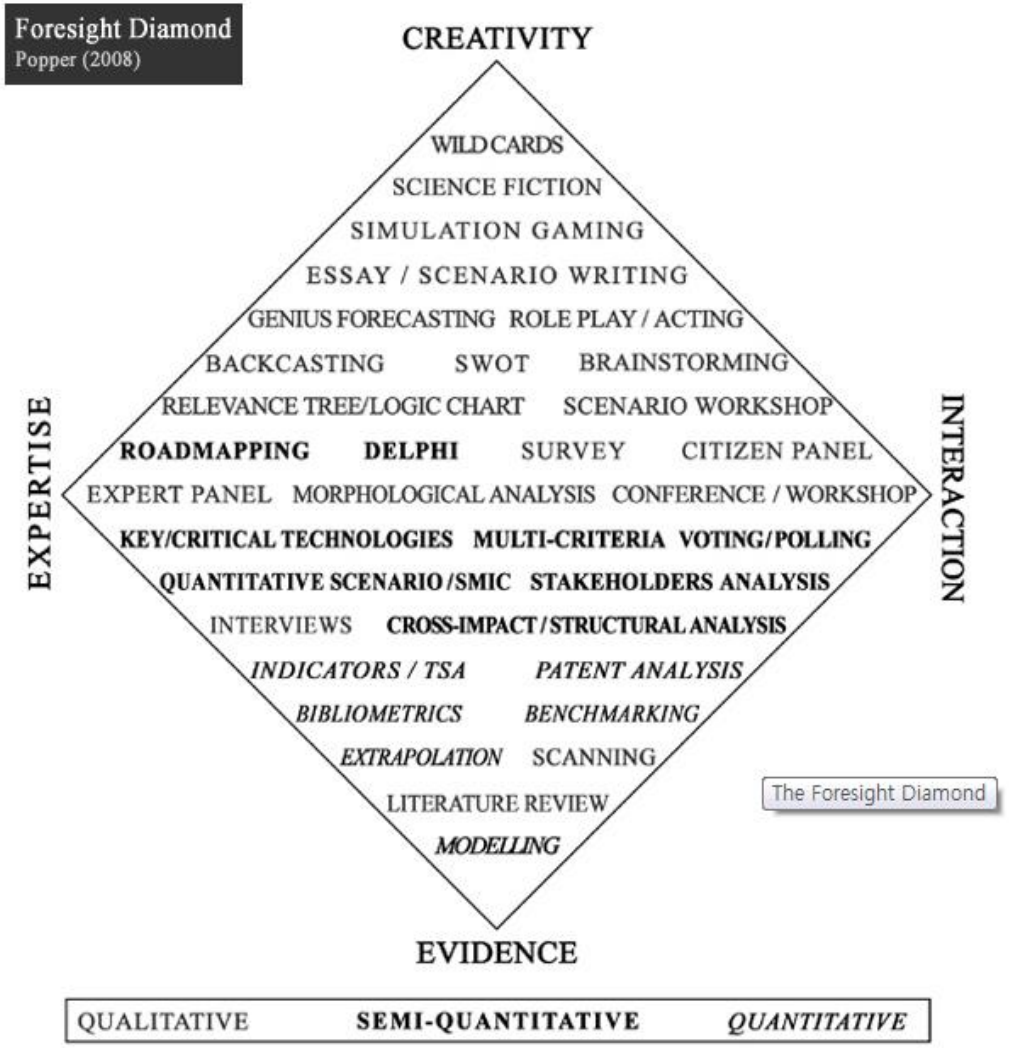
- Future Design Approach: Goals and Pathways



- Intuitive Approach

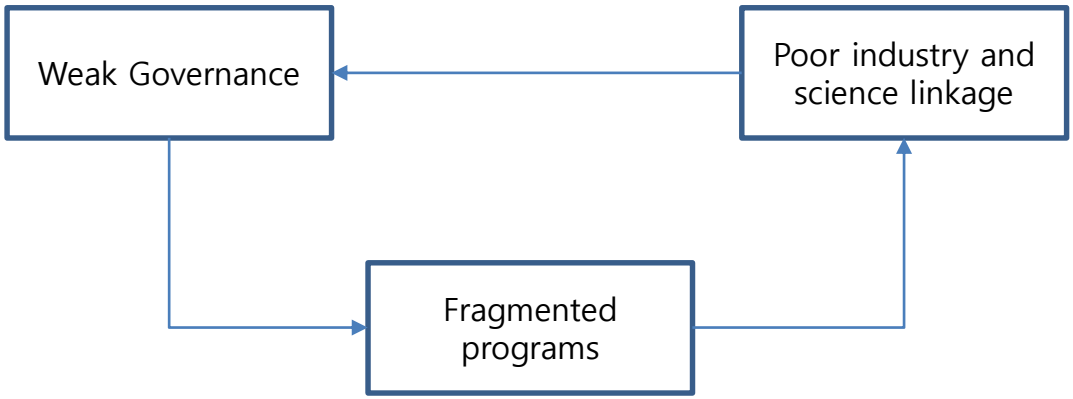
  - Appropriate methodology for effective planning with limited resources and time

  - Expert panel brainstorming

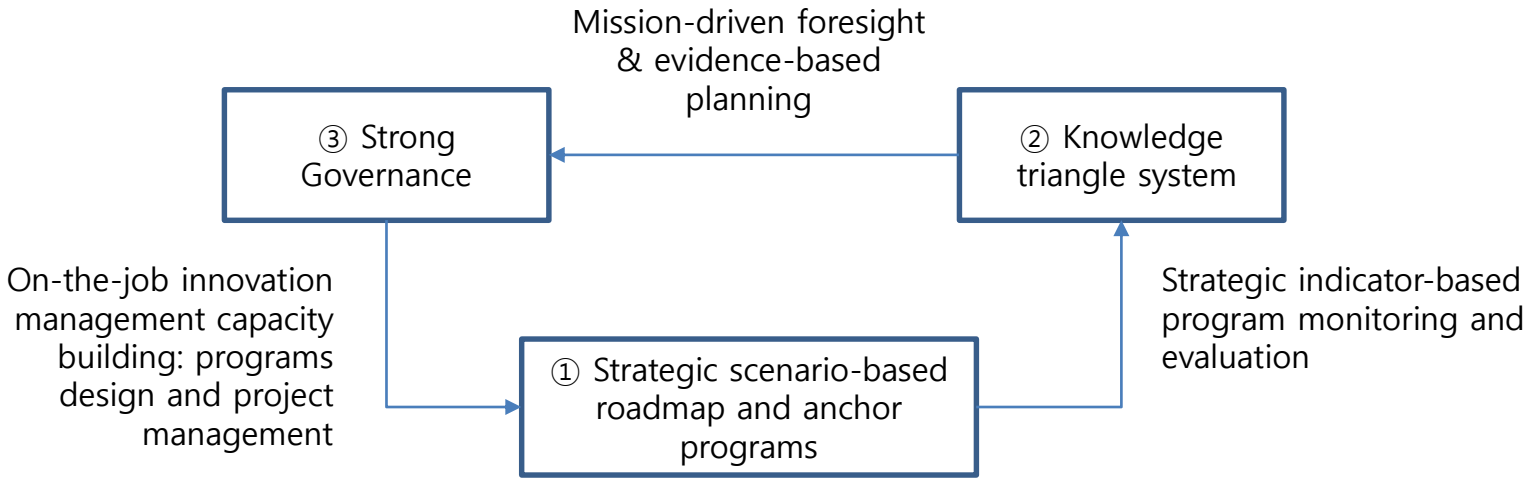


4. Roadmap and Action Planning Guides

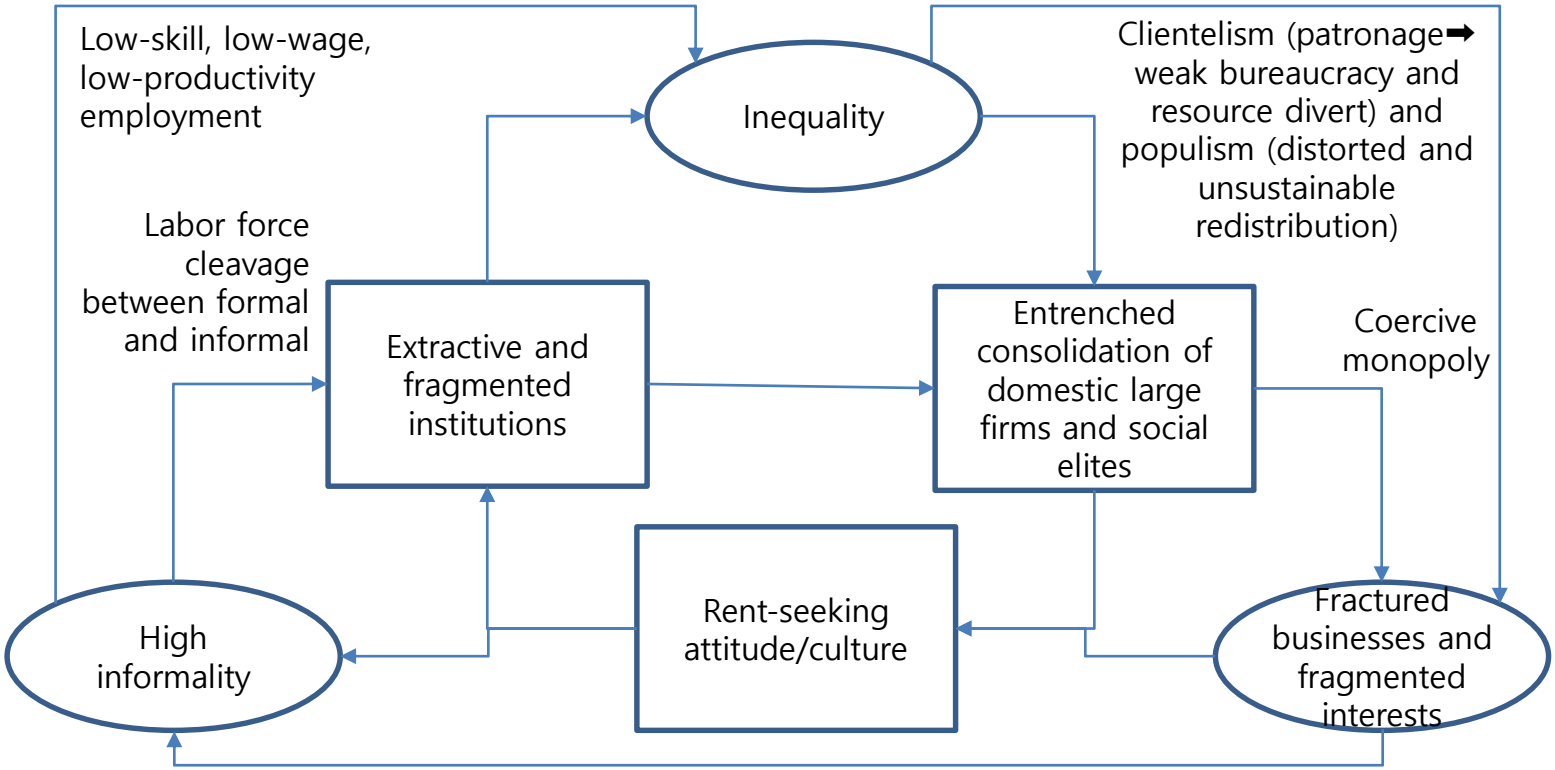
Vicious strategy cycle



Proposed strategic cycle creation



Considerations for Innovation governance



Premature deindustrialization and massive and relatively stable shift from rural informality to urban informality abetted by migrant workers
Lack of long-term investment for skill and innovation infrastructure especially by MNCs, local politicians and elites, and big business fissures

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Thank you for your attention!