Korean STI Strategy for Industrial Development and Policy Implications for Chile

Presented at

Korean Innovation Policy Week
Santiago, Chile

October 9, 2015

Yongsuk Jang, Ph.D.
Senior Research Fellow
jang@stei.re.kr
Korean STI Strategy for Industrial Development
Diagnosis on Chilean Innovation System
Policy Implications for Chile
• Korean STI Strategy for Industrial Development
• Diagnosis on Chilean Innovation System
• Policy Implications for Chile
Republic of Korea (South)

A Small Land with Scarce Resource
Korea's Economic Development, 1953-2013

2nd Poorest Country in 1945

8th Largest Economy in 2014

Source: The Bank of Korea

- 1953-1970: Per Capita GNP (current US$, 1975 base year)
- 1971-2010: Per Capita GNI (current US$, 2005 base year)
Korean Economic Growth in Comparison

Korean Experience: From Poverty to Prosperity

* Korea emerging from one of the poorest agrarian economies into an industrialized country, mainly through an outward-oriented industrialization.

GDP per capita (Current price, US $) by country

1962

<table>
<thead>
<tr>
<th>Country</th>
<th>GDP per Capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sri Lanka</td>
<td>140</td>
</tr>
<tr>
<td>Philippines</td>
<td>157</td>
</tr>
<tr>
<td>Mexico</td>
<td>369</td>
</tr>
<tr>
<td>Korea</td>
<td>104</td>
</tr>
<tr>
<td>India</td>
<td>92</td>
</tr>
<tr>
<td>China</td>
<td>70</td>
</tr>
</tbody>
</table>

2013

<table>
<thead>
<tr>
<th>Country</th>
<th>GDP per Capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sri Lanka</td>
<td>3,280</td>
</tr>
<tr>
<td>Philippines</td>
<td>2,765</td>
</tr>
<tr>
<td>Mexico</td>
<td>10,307</td>
</tr>
<tr>
<td>Korea</td>
<td>25,977</td>
</tr>
<tr>
<td>India</td>
<td>1,499</td>
</tr>
<tr>
<td>China</td>
<td>6,807</td>
</tr>
</tbody>
</table>

• PPP-adjusted per capita GDP in 2013 (in current international $): Korea: $33,140  vs Japan: $36,316

Source: Korea’s Industrial and Trade Policy: Historical Overview, KDI
Export-oriented Industrial Development

**“Select and Focus” Strategy**

**1960s**
- Light Industries
  - Import Protection
  - Foster export-oriented light industry

**1970s**
- Heavy Industries
  - Introduce new technology, expand technological capability

**1980s**
- Assembly & Processing Industries
  - Promote import liberalization
  - Expand investment in technological development, training of skilled manpower

**1990s**
- IT Industry
  - Strengthen demand-driven technological innovation
  - Establishment of nationwide IT infrastructure
Korean STI Strategy: Meeting Industrial Demands

**Demand Side**

- Self-Sustain Import-Subs.
- Mfg. Capacity Industrial Seeds
- Open Market
- Higher Value-added
- Industrial Diversification
- Industrial Convergence

**Industry-Oriented STI Strategy**

- Light Industries
- Heavy Industries
- Assembly & Processing Industries
- IT Industries
- New Growth Engines
- Creative Economy

**Supply Side**

- Import Protection Export-Orient
- Import Tech. Tech. Capability
- Expand R&D Skilled HR
- Demand-oriented Innovation
- Endogenous Tech.
- Creative R&D Capability
Paradigm Shift of Korean STI Policies

1962
1st 5-Year Economic Plan
Korea Institute of S&T (KIST)
Ministry of S&T (MOST)

1966
Korea Advanced Institute of Science (KAIS)

1967

1971

1981
Technology Development Promotion Act

1982
Industrial Generic Technology Development Program (IGTDP)

1987
National R&D Program (NRP)

1991
Information and Communication R&D Program (ICRP)

1992
Highly Advanced National Project (HAN)

1997
Financial Crisis

1997
Deputy Prime Minister of MOST (OSTI)

2004
MEST & MKE

2008
MSIP

2013

S&T Leadership

Institutional Building

Technology Catching-up
Trends of Total R&D Exp. and R&D/GDP in Korea

$ 59 Billion (4.15%) in 2013

Target 5%
Trends of Public vs. Private R&D Investment in Korea

Public R&D: Promoting Private R&D

Korea in Global R&D (2013)

Source: 2014 Global R&D Funding Forecast, Battelle (2013)
Major S&T Achievements

Science & Technology Articles

- 1981: 4 (53rd)
- 1997: 7,870 (18th)
- 2013: 51,051 (12th)

International Patents

- 1984: 10
- 1997: 30
- 2012: 1,891
- 2013: 11,848

Science & Technology Competitiveness (IMD)

- 2001: 21st
- 2002: 17th
- 2003: 24th
- 2004: 17th
- 2005: 13th
- 2006: 10th
- 2007: 7th
- 2008: 14th
- 2009: 14th
- 2014: 6th

- Science Competitiveness
- Technology Competitiveness
• Policy Coordination towards National Development
  • Economic Policy + Industrial Policy + STI Policy
  • STI Policies supported Economic & Industrial Dev. Strategies
  • Meeting Industrial Technological Demands
  • Facilitated and Encouraged Private R&D Investment & Innovation

• ‘Select and Focus’ Strategy (Strategic Selectivity)
  • Not an Option but a Must Strategy
  • Under the condition of scarce natural resources and limited financial resource
  • Selected and Focused on Decadal Strategic Industries
  • STI Policies focused on providing necessary industrial tech.

• Export-oriented Growth Strategy
  • Import-substitution Export-oriented Economic Development
  • Promoting Export in Strategic Industries
  • Need World-class Technological capacities
Characteristics of Korean Strategies II

- **Critical Mass (Economy of Scale)**
  - Critical Level (not sufficient) of Budget Secured
  - for any Initiative or Program
  - through Budget Process

- **Strategic Approach (Planning for Implementation)**
  - Comprehensive Plan for Long-term Vision
  - followed by Mid-term Plan,
  - Annual Action Plans with Budget Obligations, and
  - Monitoring and Evaluation on Implementation

- **Education!**
  - High Fever on Education (College Enrollment Rate = 72.5% in 2011)
  - Confucian Tradition: Scholars - Farmers - Manufacturers - Merchants
  - Could successfully provided necessary skilled HR, Technicians,
    High-Caliber S&Es for STI
Characteristics of Korean Strategies III

- **Leading Players (Champions)**
  - EPB (Min. of Economy) for National Development Strategy
  - MOST for STI Policies
  - GRIs for Technological Advancement
  - Chaebols for Private Sector

- **MOST (Ministry of Science and Technology)**
  - Established in front (1967) to build and orchestrate STI institutions, resources and players
  - Promoted to the level of Deputy Prime Minister Level later

- **GRIs (Government-sponsored Research Institutes)**
  - Semi-Public Entities: Not Civil Servants but Private Professionals
  - Away from bureaucracy towards Autonomous Operation
  - KIST (1966) and 26 Spin-offs

- **Policy Think-tanks and Managing Agencies**
  - For Professional Development and Implementation of Policies
  - Supporting Rational Policy Decisions & Enabling Strategic Approaches
Contents

- Korean STI Strategy for Industrial Development
- Diagnosis on Chilean Innovation System
- Policy Implications for Chile
Diagnosis on Chilean Innovation System I

- **Resource-driven Economy**
  - The Most Developed Economy in Latin America
  - The Only OECD Member in South America
  - Strong Free Market Economy & High level of Global Openness
  - But, Still a Resource-driven Economy

- **Relatively Strong Science Bases**
  - Few but Well-established Top Universities
  - CoEs in Universities Playing Major Role in Research
  - Strong Natural Sciences (esp., in Biology and Astronomy)
  - But, Weak linkages with Industrial Technological Demands

- **Limited Innovation Demands**
  - Various programs available to foster innovation in private sector
  - But, weak innovation capacity in private sector (R&D expenditure in private sector/GDP: 0.13%)
  - Limited demand for R&D and innovation (5.4% of univ.’s R&D funding is coming from private sector)
Coordination Failure due to Unclear Roles & Functions
- Well-designed diverse programs at CONICYT, CORFO and others
- But, they are similar and duplicated
- Coordination Failure among policies and programs

Lack of Critical Mass
- Rapid growth of R&D investments
- But, $1 B (0.39% GERD/GDP) on R&D still too small
- Lack of critical mass to achieve policy goals
- R&D project funding dispersed to reach many researchers in small scale

Lack of Strategic Approach
- No coherence in selecting the strategic sectors
- Horizontal Approach in allocating research funds => Failed in creating critical mass
• Weak Capacities at both the Individual and Institutional Levels
  • Researcher- or project-based support without continuity
  • Too many sliced funding sources for the similar goals
  • Failed in internalizing & institutionalizing R&D and Technology Transfer capacities

• Weak Regional Innovation Capacities
  • No clear governance system for regional innovation
  • Few regional STI resources are concentrated in a few regions (e.g., the Metropolitana, Biobio, and Balparaiso regions)
  • Weak coordination between central and regional STI policies
• Korean STI Strategy for Industrial Development
• Diagnosis on Chilean Innovation System
• Policy Implications for Chile
Policy Implications for Chile I

• Building STI Institutional Framework
  • Promoting Shared Vision
  • Need for Strategic Approach by setting goals, targets and actions for effective implementation
  • National Development Plan, Basic STI Plan, Action Plan, etc.

• ‘Select and Focus’ Strategy
  • Selecting strategic industries at the system level
  • Strategic and improved allocation of the Increased R&D investment to achieve critical mass

• Dramatic Expansion of R&D Investment
  • Critical mass is prerequisite for effective outcomes
  • Reaching 1% R&D intensity during this Administration
  • Reaching OECD avg. of R&D intensity by 2030
Policy Implications for Chile II

- **Industrial Policy for Demand-based Innovation**
  - For sustainable growth, strong basis of industries desirable
  - Industrial development creating strong technological demands for innovation
  - Comparative Advantage vs. Strategic Advantage
  - Diversification around existing industries + Creating New Strategic Industries

- **Promoting PRIs**
  - For Demand-oriented R&D (industrial R&D)
  - For Institutionalizing R&D Capacities
  - For Providing Quality Jobs for High-caliber S&Es
  - Achieving critical mass in larger scale

- **Strengthening Policy Capacities**
  - Establishment of STI Policy Think-tank
  - To support robust policy making (evidence-based policy making)
  - To institutionalize policy analysis capacities
Policy Implications for Chile III

- Developing Regional Innovation Parks
  - Regional Innovation Parks = Industrial Park + Techno Park
  - For Regional Innovation and Balanced Development
  - Also support policy planning relating to regional strategic industries
  - Towards Regional Inclusive Innovation

- Strengthening Public Policy Governance
  - Streamlining and Strengthening STI Policy Governance
  - Strengthening coordination among policies and programs
  - Clarifying roles & functions of each institution
Innovation Strategies at Different Development Stages

STI Leadership

Catching-Up

Institution Building
Thank You!

Muchas Gracias!