Korea’s Experience with Economic Development and Transformation

Camino Real Hotel, Mexico City
28th January 2016
Kyung Soon Song, PhD
Key Questions for Deliberation

Main Question for the Conference

• *How to Leverage Extractives for Resource-rich Countries to Develop Competitive Downstream or Affiliated Industries?*

Key Questions for the Session

• *How was Korea able to develop industries for iron & steel to integrated circuits from scratch even with little endowment of natural and energy resources?*

• *What useful lessons and references could be drawn for resource-rich developing countries from the Korean example and experiences?*
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III  Any Useful References for Mexico and Others?
I. A. Korea’s Transformation since the 1950s

1. Destruction and Misery of the Korean War (1950-53)
I. A. Korea’s Transformation since the 1950s

2. Korea in the 1950s

Per Capita GNP: 67 dollars

1953

“This country has no future. This country will not be restored even after a hundred years.”

—Douglas MacArthur—

“How can a rose blossom from a garbage dump?”

Vengalil Menon / Head of UN Special Delegation
I. A. Korea’s Transformation since the 1950s

3. Korea Today

Alvin Toffler

Korea has gone through an amazingly rapid and successful technological transformation. This is fabulous!

Eric Schmidt

CEO, Google Inc.

Korea is one of the early countries to use the Internet and has a strong history of innovation in technology. The foresightedness of the government gave it a No.1 position in broad-band wire.
I. A. Korea’s Transformation since the 1950s

4. Key Aspects of Korea’s Transformation (1)

*A Glimpse on the Change of Korea’s Economic and Social Indicators*

<table>
<thead>
<tr>
<th>Indicator</th>
<th>1961</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal GDP (USD)</td>
<td>2.36 Billion (38th)</td>
<td>1.45 Trillion (11th)</td>
</tr>
<tr>
<td>Per Capita GNI (USD)</td>
<td>82 (91st)</td>
<td>24,758 (41st)</td>
</tr>
<tr>
<td>Total Exports (USD)</td>
<td>40.9 Million (below 100th)</td>
<td>559 Billion (7th)</td>
</tr>
<tr>
<td>Life Expectancy (Years)</td>
<td>55.3 (below 100th)</td>
<td>80 (19th)</td>
</tr>
<tr>
<td>School Enrollment Rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior High Schools</td>
<td>29.3%</td>
<td>99.6%</td>
</tr>
<tr>
<td>Universities/College</td>
<td>9.0%</td>
<td>80%</td>
</tr>
<tr>
<td>Employment Share</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture, Forestry &amp; Fish</td>
<td>63%</td>
<td>7%</td>
</tr>
<tr>
<td>Mining &amp; Manufacturing</td>
<td>8.7%</td>
<td>16.4%</td>
</tr>
</tbody>
</table>

* ( ): World Ranking
I. A. Korea’s Transformation since the 1950s
4. Key Aspects of Korea’s Transformation (2)

Evolution into an Advanced Economic Structure with a Growing Service Sector

* % in Total Population
## Transition in the Structure of Export Products away from Commodities & Textiles

### <Changes of Export Products by Time>

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Iron Ore</td>
<td>Textiles</td>
<td>Textiles</td>
<td>Electronics</td>
<td>Semiconductors</td>
</tr>
<tr>
<td>2</td>
<td>Tungsten Ore</td>
<td>Plywood</td>
<td>Electronics</td>
<td>Textiles</td>
<td>Computers</td>
</tr>
<tr>
<td>3</td>
<td>Raw Silk</td>
<td>Wigs</td>
<td>Iron and Steel Products</td>
<td>Footwear</td>
<td>Automobiles</td>
</tr>
<tr>
<td>4</td>
<td>Anthracite</td>
<td>Iron Ore</td>
<td>Footwear</td>
<td>Iron and Steel Products</td>
<td>Petrochemical Products</td>
</tr>
<tr>
<td>5</td>
<td>Cuttlefish</td>
<td>Electronics</td>
<td>Ships</td>
<td>Ships</td>
<td>Ships</td>
</tr>
</tbody>
</table>

Annual Export Increase 43.5% (‘62-’76)
One of the Poorest Countries in the ‘1950s, Converted to a Donor OECD Member by early ‘80s
I. A. Korea’s Transformation since the 1950s

4. Key Aspects of Korea’s Transformation (5)

Conversion from an Authoritarian Regime to a Full Democracy by mid-1980s

In June 1987, strenuous efforts were made to overthrow the military regime and place democracy in the Korean society.
I. B. Evolution of Korea’s Development Strategies

1. Backdrop for Development Strategy Formulation in the 1950s

Overall Conditions Typical of Newly Independent Countries after the World War II after almost 4 Decades of Colonization by a Neighboring Country

- Adoption of open-door policy by force
- Dependent economy under Japanese rule
- The Korean War

Dependent economy with uncertainties and volatilities:
- Literacy rate 33%
- Infant mortality 116 out of 1000
- Inflation during period of Aug - Dec, 1945 -> 2,446%
- Per capita income at a similar level with Mozambique, Ghana, and Bangladesh

"Expecting to see economic development in Korea is like waiting for flowers to bloom in a garbage bin."

- Press release, 1957
I. B. Evolution of Korea’s Development Strategies

2. Institutional Start-up for a Focus on Economic Development

Korea’s Development Process Started with Institution Building and Planning

On January 13, 1962, the first Five Year Plan was announced. This plan laid the foundation for Korea’s astounding economic growth that the world came to call the “Miracle on the Han River.”
### I. B. Evolution of Korea’s Development Strategies

#### 3. Five-Year Plans, Strategies and Performance (1)

*Korea’s Socioeconomic Development Proceeded under a Series of 7 Five-Year Plans Were Executed during 1962-96 until Markets Became Functional Enough to Replace the Role of Proactive Planning*

<table>
<thead>
<tr>
<th>Plan</th>
<th>Period</th>
<th>Strategy</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>1962-1966</td>
<td>- Expand electrical/coal energy industry</td>
<td>- 7.8% GDP growth p.a. exceeding expectations</td>
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<tr>
<td></td>
<td></td>
<td>- Emphasize importance on the infrastructure for establishing a solid foundation</td>
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<tr>
<td></td>
<td></td>
<td>- Enhance agricultural productivity</td>
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<tr>
<td></td>
<td></td>
<td>- Neutralize balance of payments</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>- GNI per capita grew from $83 to $125</td>
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<tr>
<td>2nd</td>
<td>1967-1971</td>
<td>- Seek to shift the Korean state into heavy industry by making Korea more competitive in the world market</td>
<td>- 9.7% GDP growth p.a.</td>
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<tr>
<td></td>
<td></td>
<td>- Build major highways for easier transportation</td>
<td>- $1.4 Billion foreign capital inflow</td>
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<td></td>
<td></td>
<td>- Establish food self-support</td>
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<tr>
<td></td>
<td></td>
<td>- Forest greenification</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>- Big Push to fund the HCIP</td>
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<tr>
<td></td>
<td></td>
<td>- Borrow heavily from foreign countries</td>
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</tbody>
</table>
## I. B. Evolution of Korea’s Development Strategies

### 3. Five-Year Plans, Strategies and Performance (2)

<table>
<thead>
<tr>
<th>Period</th>
<th>Strategy</th>
<th>Results</th>
</tr>
</thead>
</table>
| 4<sup>th</sup> 1977-1981 | ❖ Construct self sustainable economy  
❖ Improve social equality  
❖ Promote technological advancements and economic efficiency | ▪ 6.2% GDP growth p.a.  
▪ GNI per capita reach $1,000 in 1977  
▪ Achieve $10 billion exports |
| 5<sup>th</sup> 1982-1986 | ❖ Put emphasis more on efficiency, stabilization and balancing rather than growth  
❖ Boost open market economy | ▪ 8.7% GDP growth p.a.  
▪ Current account surplus for the first time  
▪ Stabilize prices |
| 6<sup>th</sup> 1987-1991 | ❖ Establish law and order in economy for promoting open free competition  
❖ Improve income distribution | ▪ 9.4% GDP growth p.a.  
▪ Host 1988 Olympic |
| 7<sup>th</sup> 1992-1996 | ❖ Enhance the global competitiveness of Korean companies  
❖ Improve social equity and balanced development  
❖ Promote internationalization  
❖ Construct foundation for unification of Korea | ▪ 7.3% GDP growth p.a.  
▪ End of Military Government |
I. B. Evolution of Korea’s Development Strategies

4. Strategies for Foundation Building in the 1960s (1)

Macro-environmental Factors Considered for Strategy Formulation
I. B. Evolution of Korea’s Development Strategies

4. Strategies for Foundation Building in the 1960s (2)

*Outward-looking Development Strategy Based on Export Promotion*
I. B. Evolution of Korea’s Development Strategies

4. Strategies for Foundation Building in the 1960s (3)

Main Performance Areas, and Notable Achievements in Basic Economic and Infrastructure Buildup for Industrialization and in the ’60s

- Buildup of Infrastructure (Roads, Ports, etc.)
- Development of Export-oriented Labor-intensive Light Industries (Textile, Plywood, Shoes, etc.)
- Modification of Economic Structure
  - Away from agriculture
  - Towards manufacturing and service industries

REAL GROWTH RATE (’61–’70): 8.5%

CPI INCREASE RATE (’61–’70) : 12.3%
I. B. Evolution of Korea’s Development Strategies
5. Changes in Economic and Industry Structure in the 1970s (1)

“New Community Movement” for Reform of the Backbone Rural Sector
I. B. Evolution of Korea’s Development Strategies

5. Changes in Economic and Industry Structure in the 1970s (2)

*Industrial Restructuring towards Heavy and Chemical Industries*

Export-driven policy focused on promoting heavy and chemical industries (HCIs) in the 1970s.

- Policy Shift Toward HCI Development
  - Mobilizing Financial Resources
  - Selecting National Champions (Chaebols)

- Iron and Steel (Pohang)
- Electronics (Kumi)
- Petro-Chem. Products (Yeochun)
- Ship-building (Wulsan)
- Machinery (Changwon)
- Automobile

[Graph showing structural change from light to heavy and chemical industries, Korea, 1970-2010]
I. B. Evolution of Korea’s Development Strategies

5. Changes in Economic and Industry Structure in the 1970s (3)

*Strong Emphasis on Human Resources Development*

- Broad access to education raised level of manpower.

- Promoting engineers and skilled workers:
  - Technical and vocational schools were established.
  - **Kum-Oh Technical High School (1972)**
    - 8 Japanese teachers with technical know-how were recruited between 1972-76.
    - In 1976, among 400 new students, more than half were top graduates from middle schools in Korea.
  - Technical licensing and certification system were introduced.

- Korea won the International Vocational Training Competition (the Vocational Olympics) **nine times consecutively** during 1977-1991.
I. B. Evolution of Korea’s Development Strategies

5. Changes in Economic and Industry Structure in the 1970s (3+)

Memo to item (3): Trends in School Enrollment Rate
I. B. Evolution of Korea’s Development Strategies

5. Changes in Economic and Industrial Structure in the 1970s (4)

Key Performance Areas, and Achievements in the Acceleration of Industrialization and Export Promotion in the 1970s

- Expedited Development of Heavy and Chemical Industries
- Sustained Rapid Growth due largely to Increase in External Trade
- “Saemaul (New Community) Movement” - Villagers Cooperated and Volunteered to Labor for Building Roads, Bridges and Rural Facilities

REAL GROWTH RATE : 7.3%

CPI INCREASE RATE : 16.5%
I. B. Evolution of Korea’s Development Strategies

6. Adjustment to “Globalization” with Market-oriented Polices since the 1980s

Korea Was Able to Overcome the Challenges Presented by “Globalization” and Moved Closer to Markets

1980s
Stable Economic Growth

- Deregulation, Market Opening for Pressure of Competition across All Sectors
- Benefits of “3 Lows”
- Launching of ODA Programs
- Initiating Stronger Social Welfare Programs
- Real Growth Rate: 8.7% p.a.

1990s
Economic Crisis & Reforms

- Political & Social Progress
- Per Capita Income Exceeding US$10,000 (‘95)
- OECD Membership (‘96)
- Asian Economic Crisis followed by Major Economic and Financial Reforms (‘97 -)

Post-2000
Recovery from Crisis & Sustained Growth

- Overcoming of and Resilience to Crisis Demonstrated
- GDP: 1,014 billion (‘10) * 15th in the world
- FX Reserves of US$317 billion (‘12) * 7th in the world
- 20-50 Club Country (‘12) * 7th country
- Trade Volume of $1.1 trillion (‘11) * 9th in the world
I. C. Characterization of Korea’s Approach to Development

1. Key Characteristics of Government Strategies and Policies (1)

1. Government leadership
   - Economic Development Planning led by the Government
     * Industrialization strategy:
       Government intervention on the price structure
   - Institution Building
   - Economic Growth First

2. Selective support on the basis of comparative advantage
   - The government selected light industry as its strategic industry in order to utilize “labor,” which was Korea’s only comparative advantage

3. Outward-looking development strategy
   - Korea could not sustain its economy by focusing on domestic markets only.
   - Inflow of foreign technologies as well as foreign capital.
   - Mitigation of the side-effects of the government-controlled economy
I. C. Characterization of Korea’s Approach to Development

1. Key Characteristics of Government Strategies and Policies (2)

4. Renovation of the Rural Area
   - Comprehensive rural community development program
   - Infrastructure building, agricultural technical service
     * resources distributed on the basis of competitiveness

5. Growth first, distribution later
   - “Increasing the size of the pie” given priority over distribution
     * Government expenditure on the social development sector amounted to only 6~7% of the annual budget
   - A favorable condition compared to other countries
     * equal poverty through wars, Land reform

6. Development of Human Capital
   - Koreans are known for traditional zeal for education
     * (’60) literacy rate 80%
   - Enhanced investment in Human Capital development
   - Financial capital produced the best results when combined with the educated human capital
I. C. Characterization of Korea’s Approach to Development

2. Other Factors that Could Explain Korea’s Development

- **Will of the People to Economize and Improve the Quality of Living**
- **Gained Confidence in Success**
- **Promotion of Spirit of Challenge**
- **Ardent Investment in Education**
- **Ecosystem for Continuous Innovation**
- **Devoted Sacrifice of its People**
- **Importantly, the “Luck” Factor**
First of all, Korea recognized that it had to restructure some of its policies and some of its industries, and then it did that aggressively and forcefully, provided leadership in that. It did not wait for the rest of the world to make it happen.

Economic growth is dependent on the character of the nation.

— Edmund Phelps / 2006 Nobel Prize Laureate in Economics —
I. D. Government as a Key Driver for Development

1. Did Korea Maintain a Big Government in the Process?

*Statistics Indicates a Rather Efficient Government*

- **Number of the Civil Servants?**
  - **NO!!**
  - The Number of Korea’s civil servants is traditionally small.
    - ‘93 18 per population of 1000
    - far below the average of OECD

- **Government Portion in the GDP?**
  - **NO!!**
  - Government expenditure ('65) explains only 9.4% of GDP
    - one of the lowest in the world

- **Impact on the Economy?**
  - **YES!!**
  - Government was the Main Driver of growth, leading the overall economic system
I.  

**D. Government as a Key Driver for Development**

2. How Did the Gov’t Maintain a Leadership in the Process?

*Government Leadership Was Possible through Active: (i) Vision Sharing; (ii) Pursuit of People Support; and (iii) Implementation and Monitoring of Development Process together with the Private Sector*

### Vision Sharing

- “Modernization of Motherland”
- “Industry & Export-based National Development”
- “Exportization of All Industries”
- “Heavy and Chemical Export Promotion”

### Seeking Support of People

- Inclusive Growth
- Anti-Corruption
- Leading by Example

### Active Implementation & Monitoring

- Close Partnership with Private Sector
- Monthly Export Promotion Ministerial Meeting (177 times, ‘63-’79)
I. **D. Gov’t Role as a Key Driver for Development**

3. Strategic Leadership and Effective Assistance from MDAs/BDAs

*Consultation with key MDAs, in particular the World Bank, Was Extremely Important at Every Important Step of Development Planning*

<table>
<thead>
<tr>
<th>Plan Period</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1<sup>st</sup> 5-Year Plan: 1962-1966 | - Nurturing import substituting industry  
- Shifting to export & industry-oriented economy |
| 2<sup>nd</sup> 5-Year Plan: 1967-1971 | - Strengthening international competitiveness of light industry  
- Localization of industrial materials |
| 3<sup>rd</sup> 5-Year Plan: 1972-1976 | - Heavy and Chemical Industrialization Plan  
- "Big Push“ for maximization of export |
| 4<sup>th</sup>: 1977-1981 | - Promotion of plant industry  
- Industrial Rationalization |
| 5<sup>th</sup>: 1982-1986 | - Plant export promotion  
- Enhancing skill level of private companies |
I. D. Government as a Key Driver for Development

4. Strategic Resource Mobilization, Distribution and Usage

Proactive Role in Resource Mobilization from Domestic and Foreign Sources, Allocation of Resources for Strategic Sectors

Efficient Utilization of External Resources

- Productive use of foreign aid (ODA received until ‘80s: $16.4bil)
- Government’s guarantee for foreign borrowings
- Strategic investment of the resources for infrastructure, industrial facilities

Mobilization of Domestic Resources

- Tax revenue dramatically increased by 66.5% (‘66), 48.3% (‘67), 50.5% (‘68)
- National Investment Fund (56.8% of all facility investment during 1974-1981)

Policy-driven Financing

- The real deposit rate remained in low or negative through ‘70s
- Government directly decided the amount of credit and interest rate for each company based on its past performances
  - Policy loan in all banks’ portfolio: 40% (‘75) -> 50% (‘79)
  - Export sector/ HCI sector
I. **D. Government as a Key Driver for Development**

5. Private Sector Supporter through Infrastructure Provision

*Infrastructure Buildup with Due Regard to the Promotion of Private Sector Development*

### Establishment of infrastructures

- Building favorable environment for private sector engagement
- Focusing resources on infrastructure for electricity, communications and traffic - Maximizing external economy

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**Electricity Supply**

- Thermal
- Nuclear
- Hydro

*Length of Highway*

- 1970: 0 km
- 1975: 500 km
- 1980: 1000 km
- 1985: 1500 km
- 1990: 2000 km
- 1995: 2500 km
- 2000: 3000 km
- 2004: 3000 km

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Government-led Institutions for Active Support of the Private Sector for Information, R&D and Financing

I. D. Government as a Key Driver for Development

6. Private Sector Supporter through Institutional Support

- KIST (Korean Institute of Science & Technology/ 1962)
- KOTRA(Korea Trade –Investment Promotion Agency/ 1962) - 111 Korea Business Centers in 76 countries
- KDI(Korea Development Institute/ 1971)
- Daedeok Science Town (1973) - Established by president Park with the opening of the KAIST -Over 20,000 researchers in 60 major research institutes
- EXIM Bank (Korea Export and Import Bank/ 1976) - Export credit, Trade finance, Guarantee programs
I Overall Development Strategy and Policy Setting
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II Promotion of Technology and Innovation
   A. Transition in Technology and R&D Promotion Policies
   B. Proactive Government Role in Science & Technology
   C. Evolution of Government-led Research Institutes
   D. Stakeholders in the R&D Universe

III Any Useful References for Mexico and Others?
II. A. Transition in Technology and R&D Promotion Policies

1. Technology and R&D Policies in Phases

*R&D policy has been a key element of strategies for Korea’s industrial development: In 2011 Korea’s RD&I accounted for 4.04% of GDP (# 4 in terms of global ranking)*

<table>
<thead>
<tr>
<th>Growth Stage</th>
<th>Factor-oriented Stage</th>
<th>Investment-oriented Stage</th>
<th>Innovation-oriented Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Korean Development Stage</td>
<td>Early Industrialization by Importing technology (1960s ~ late 1970s)</td>
<td>Industrial Expansion by Internalizing imported technologies (1980s ~ early 1990s)</td>
<td>Industrial enhancement by domestic technological development (early 1990s ~ 2000s)</td>
</tr>
<tr>
<td>Way to promote Technology</td>
<td>Acquisition of skills to use imported technology</td>
<td>- Improving imported Technology</td>
<td>- Creating Technology in the high-tech industries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Developing domestic Technology</td>
<td>- Developing the future-promising technology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Developing high domestic technology in some specific fields</td>
<td></td>
</tr>
<tr>
<td>Change of Action Programs</td>
<td>- Establishing the research stakeholder: the Public Research Institutes</td>
<td>- Development of research stakeholders: Rapid Increase in RD&amp;I of Large Firms</td>
<td>- Strengthening Cooperation of research stakeholders:</td>
</tr>
<tr>
<td></td>
<td>- Establishing the system, institution, governance for R&amp;D</td>
<td>- Improving the system, institution, governance for R&amp;D</td>
<td>- Efficiency of the system, institution, governance for R&amp;D</td>
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<tr>
<td>Key Research Stakeholder</td>
<td>Public Research Institutes</td>
<td>Public Research Institutes $\Rightarrow$ Large Firms</td>
<td>- Major : Large Firms,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Minors: Universities, Public Research Institutes</td>
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</tbody>
</table>

Source: Sagyun Hong, et al (2010), "Role of S&T in Advancing the Korea’s Economic Development and Its Implications to Developing Countries"
II. B. Proactive Government Role in Science & Technology

1. Government Leadership and Interventions

Setup of the Ministry of Science and Technology (MOST) in 1967

- Introduction of a ministry with an exclusive authority over national S&T policy
  - In full charge of planning, executing and evaluating the national R&D activities
- Introduction of separate ministries in charge of industrial RDI and ICT later

Introduction of a Government-wide S&T Coordination System

- A forum presided by the President or Prime Minister for policy coordination across related line ministries
  - General Science and Technology Council (1972, Prime Minister)
  - Enlarged Meeting for Technology Promotion (1982, president)
  - National Science and Technology Council (1999, President)
  - Presidential Council for Science and Technology Policy (1989, President)
  - Advisory body to the President
Consensus Building thru an ‘Enlarged Meeting for Technology Promotion’

- A meeting presided by the President for consensus building with the private sector
  - Participation by all related line ministers together with experts from both public and private sectors
  - Discussion on the technology development strategy and policy direction
  - Set up the ‘Council for Technology Promotion’ as an execution body

Active Use of ‘National Science and Technology Council’

- Council meetings presided by the President
  - 13 Ministries (Finance & Economy, Science and Technology, Human Resources and Education and Industry and Energy so on), Office for Government Coordination (Under the Prime Minister), 8 civil experts participated
  - Review and discuss the number of major policy issues in RDI activities, including: (i) finalizing a Science and Technology Plan; (ii) expansion and allocation of national R&D budget; and (iii) promoting the activities of public research organizations
II. C. Government-led Research Institutes as a Critical Mass

1. Empowering and Deepening of Government Research Institutes

**Setup of ‘KIST (Korea Institute of Science and Technology)’**

- Invited numbers of Korean scientists and engineers from abroad
- Imposed a clear-cut mission to KIST as of industrial technology promotion
  - Provided technological services such as advice, education and training
  - Supported both technology development and technology transfer

**Spinoff of ‘Government Research Institutes (GRIs)’**

- The research units in KIST has been detached and became independent GRIs
- Each of the detached GRIs has its own mission and specialties
  - KITECH (Korea Institute of Industrial Technology)
    - supports the private industrial sector in developing production tech. as well as commercialization process
  - ETRI (Electronics and Telecommunications Research Institute)
    - specializes in electronics and telecommunications R&D activities, and critically contributes to the development of ICT sector in Korea
  - KIMM (Korea Institute of Machinery and Materials)
    - Specializes in R&D for machinery and materials and supports the private sector to improve the manufacturing process and product quality
II. C. Government-led Research Institutes as a Critical Mass

2. GRIs and Local Proliferation of S&T

**Two Groups of GRIs under Separate Councils**

- **Korea Research Council of Fundamental S&T (KRCF)**
  - More focuses on national agenda such as the development of cutting-edge technologies and knowledge creation

- **Korea Research Council for Industrial S&T (ISTK)**
  - More focuses on providing technological solutions to the private sector
  - Promote the commercialization of R&D outcomes and technology transfer between the public and private sector

**Establishment of the ‘Daedeok Science Town’**

- Korea set up so-called the R&D cluster in *Daedeok*
  - To promote the joint research among GRIs and provide one-stop service to the private industrial sector

- Most GRIs are located in the *Daedeok Science Town*

- The *Daedeok Science Town* has been developed into the *Daedeok Innopolis* recently
  - Most of GRIs along with other public research organizations and universities
  - The private R&D institutes along with bunch of SMEs

**Regional Technology Parks**

- Introduced to facilitate the regional innovation activities among SMEs and universities
- Currently 18 technology parks are active in Korea
II. C. Government-led Research Institutes as a Critical Mass

3. Programs for Government-sponsored R&D Activities (1)

**A unified National R&D Program (NRDP)**
- Korean government integrated the individual R&D program into unified national program in 1982 in order to implement the national RDI activities more effectively

**Executing Public Agencies**
- Korea Research Council for Economics, Humanities and Social Sciences (NRCS)
  - Provides various types of policy advice to the related Ministries
  - STEPI (Science & Technology Policy Institute) for S&T policies
- Other public agencies under the direct supervision of each Ministry
  - Funding agencies such as NRF (National Research Foundation) and KIAT (Korea Institute for Advancement of Technology) so on
  - Evaluation agencies such as KISTEP (Korea Institute of S&T Evaluation & Planning), KEIT (Korea Evaluation Institute of Industrial Technology) so on
  - Korea Industrial Technology Association (KOITA)
    - In charge of promoting industrial R&D in the private sector
    - Provides funding, up-date information, education and training as well as support international cooperation
RDI on the Basis of the National Agenda (*Special Attention Needed)

- From the first, RDI activities in Korea have had the clear-cut purpose
  - Supporting the industrialization process by promoting the private R&D
  - Supporting the national defense by providing the technological solutions

- In 1970s, Korean government focused on the development of heavy industries, and RDI programs and activities are aligned with the industrial policies in order to meet the market demand

Virtuous Circle for Brain-Return and Human Resource Development

- At the initial stage of R&D initiative, the Korean government invited Korean scientists and engineers from abroad with massive incentives to man KAIST
- These scientists and engineers formed a critical mass at KAIS (KAIST) to nurture R&D manpower
- Once KAIST became self sustaining, Korean government started supporting R&D activities in universities more actively
## II. *D. Stakeholders in R&D Universe*

### 1. Main Stakeholders

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Role</th>
<th>Implementation Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Government</strong></td>
<td>Regional Innovation Platform</td>
<td>▪ Developing the Regional Technoparks in 16 regions</td>
</tr>
<tr>
<td></td>
<td>Infrastructure</td>
<td>▪ Constructing the Cluster for research institutes, universities, firms, residential facilities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ Regional Technopark, R&amp;D Specialized Center, Technology Commercialization Center, Business Incubator, Industrial Park</td>
</tr>
<tr>
<td></td>
<td>R&amp;D</td>
<td>▪ Road Map of Developing Regional Industry</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ Regional R&amp;D Policy Planning, Performing, Controlling, Supporting RD&amp;I</td>
</tr>
<tr>
<td></td>
<td>Training Human Resources</td>
<td>▪ Establishing and Improving the law and Institution for Regional RD&amp;I</td>
</tr>
<tr>
<td></td>
<td>Infrastructure</td>
<td>▪ Supporting the employee’s Training and the industry-university education programs</td>
</tr>
<tr>
<td><strong>Regional Technopark</strong></td>
<td>Programs related to R&amp;D</td>
<td>▪ Human Resource Training Center, Policy Planning Center, Business Services Center</td>
</tr>
<tr>
<td></td>
<td>Training Human Resources</td>
<td>▪ Supporting R&amp;D programs, Technology Commercialization, Supporting Technology</td>
</tr>
<tr>
<td></td>
<td>Networking Programs</td>
<td>▪ Programs of Training the employees by operating Human Resource Training Center</td>
</tr>
<tr>
<td></td>
<td>Infrastructure</td>
<td>▪ Supporting domestic and international Networking Programs</td>
</tr>
<tr>
<td><strong>R&amp;D Specialized Center</strong></td>
<td>R&amp;D</td>
<td>▪ Regional Specialized Center in 16 regions</td>
</tr>
<tr>
<td></td>
<td>Projects</td>
<td>▪ Conducting Technology Commercialization for the regional SMEs</td>
</tr>
<tr>
<td></td>
<td>Infrastructure</td>
<td>▪ Conducting R&amp;D for the regional SMEs</td>
</tr>
<tr>
<td><strong>Universities</strong></td>
<td>R&amp;D</td>
<td>▪ Technology Commercialization by operating Technology Commercialization Center</td>
</tr>
<tr>
<td></td>
<td>Projects</td>
<td>▪ Invigorating Start-ups by operating Business Incubators</td>
</tr>
<tr>
<td></td>
<td>Infrastructure</td>
<td>▪ Conducting Short-term R&amp;D projects with the regional SMEs</td>
</tr>
<tr>
<td><strong>Firms</strong></td>
<td>Training Human Resources</td>
<td>▪ Educating and Providing the Human Resources based on the demand of firms</td>
</tr>
<tr>
<td></td>
<td>R&amp;D</td>
<td>▪ Performing the Cooperation Projects of Industry-University-Research Institute</td>
</tr>
<tr>
<td></td>
<td>Projects</td>
<td>▪ Mentoring the Entrepreneurship Programs</td>
</tr>
</tbody>
</table>
II. **D. Stakeholders in R&D Universe**

2. Science & Technology Park as a Regional Innovation Platform

16 Regional Technoparks, Daedeok S&T Park Being the Most Notable One, Have been Set up as Regional Innovation Cluster and Platform with Particular Attention to Strategic industries and GRIs Played a Role – Daedeok S&T Park with More Attention to National Strategic Industries
In Korea, Technology Products from Collaborative R&D Activities between Academia, Public and Private Research Centers and Industry Include the Companies like Samsung & LG, as Technologies like DRAM, WiBro, DRAM, etc.
Overall Development Strategy and Policy Setting
A. Korea’s Transformation since the 1950s
B. Evolution of Korea’s Development Strategies
C. Characterization of Korea’s Approach to Development
D. Gov’t Role as a key Driver for Development

Promotion of Technology and Innovation
A. Transition in Technology and R&D Promotion Policies
B. Proactive Government Role in Science & Technology
C. Government-led Research Institutes as a Critical Mass
D. Stakeholders in the R&D Universe

Any Useful References for Mexico and Others?
### III. Any Useful References for Mexico and Others?

1. A Simple Relevance Check

<table>
<thead>
<tr>
<th></th>
<th><strong>Mexico</strong></th>
<th><strong>Korea</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>$1,232 billion (2015 est.)</td>
<td>$1,393 Billion (2015 est.)</td>
</tr>
<tr>
<td>GDP rank</td>
<td>15\textsuperscript{th} (nominal) / 11\textsuperscript{th} (PPP)</td>
<td>13\textsuperscript{th} (nominal) / 13\textsuperscript{th} (PPP)</td>
</tr>
<tr>
<td>GDP growth</td>
<td>3% (2015 est.)</td>
<td>3.3% (2014)</td>
</tr>
<tr>
<td>GDP per capita</td>
<td>$18,370 (PPP, 2015 est.)</td>
<td>$35,485 (PPP, 2014 est.)</td>
</tr>
<tr>
<td>GDP by sector</td>
<td>Agriculture: 3.6%; industry: 36.6%; services: 59.8% (2011)</td>
<td>Agriculture: 2.6%, industry: 39.2% , services: 58.2% (2010)</td>
</tr>
<tr>
<td>Inflation (CPI)</td>
<td>2.5% (2015 est.)</td>
<td>1.1% (2014)</td>
</tr>
<tr>
<td>Population below poverty line</td>
<td>45.8% (2015 est.)</td>
<td>15% (2014)</td>
</tr>
<tr>
<td>Population</td>
<td>126.1 million (2014)</td>
<td>50.6 million (2014)</td>
</tr>
<tr>
<td>Labour force</td>
<td>52.9 million (2014 est.)</td>
<td>25.18 million (2012 est.)</td>
</tr>
<tr>
<td>Labour force by occupation</td>
<td>Agriculture: 13.4%; industry: 24.1%; services: 61.9% (2011)</td>
<td>Agriculture: 6.4%, industry: 24.2 %, services: 69.4% (2011 est.)</td>
</tr>
<tr>
<td>Main industries</td>
<td>Food &amp; Beverage, Tourism, Chemicals, Mining, Petroleum, Iron &amp; Steel, Textile,</td>
<td>Electronics, telecommunications, automobile production, chemicals, shipbuilding, steel</td>
</tr>
<tr>
<td>Ease-of-doing-business rank</td>
<td><strong>49\textsuperscript{th}</strong></td>
<td><strong>5\textsuperscript{th}</strong></td>
</tr>
</tbody>
</table>
• Similarities between Mexico and Korea
  ✓ Location and Proximity to the Major Export Markets
  ✓ Size of the Local Market
  ✓ Economic Structure by Industries

• Differences between Mexico and Korea
  ✓ Endowment of Natural and Energy Resources
  ✓ Composition of Industries
  ✓ Population
  ✓ Poverty Level
  ✓ Education and Literacy

• Examples of Provocative Questions
  ✓ What is the Proper Balance between Planning and Market?
  ✓ Is the Government Authorized and Able to Draw a Realistic Blueprint and Elaborate Adequate R&D Strategies/Policies/Programs?
  ✓ Are Such Strategies/Policies/Programs in Place?
  ✓ Are Government Leaders Determined to Carry the Banner for the Execution of Such a Blueprint and Expensive and Risk-Involved Strategies/Policies/Program?
  ✓ Is the Public and Private Partnership Healthy and Capable Enough to Lead Collaborative R&D Projects Successfully?
  ✓ Is There a Scope to Link Public R&D and Poverty Alleviation/Welfare?
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