The Role of Science and Technology in the Development of Korea

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Abstract

It is well recognized that rapid development of South Korea was supported by the development of science and technology. However, it is not known well how the national science and technology policy and strategic initiatives have played the role. Even though it is not possible to discuss all the details of such a rapid development process in short presentation, some of the key factors for S&T development are presented. In addition, the challenges for the future development of Korea's Innovation System was described. The unique development experience of Korea may not be directly applicable to other developing countries. However, Korean experience shows the importance of Science and Technology in the national development, and suggests that the right policy with consistent support are critical factors. Now the challenges facing Korea are fundamental ones in nature and they require systematic changes and requires fine-tuned and inclusive policy. Finally, STI collaboration ideas with South Korea are presented.

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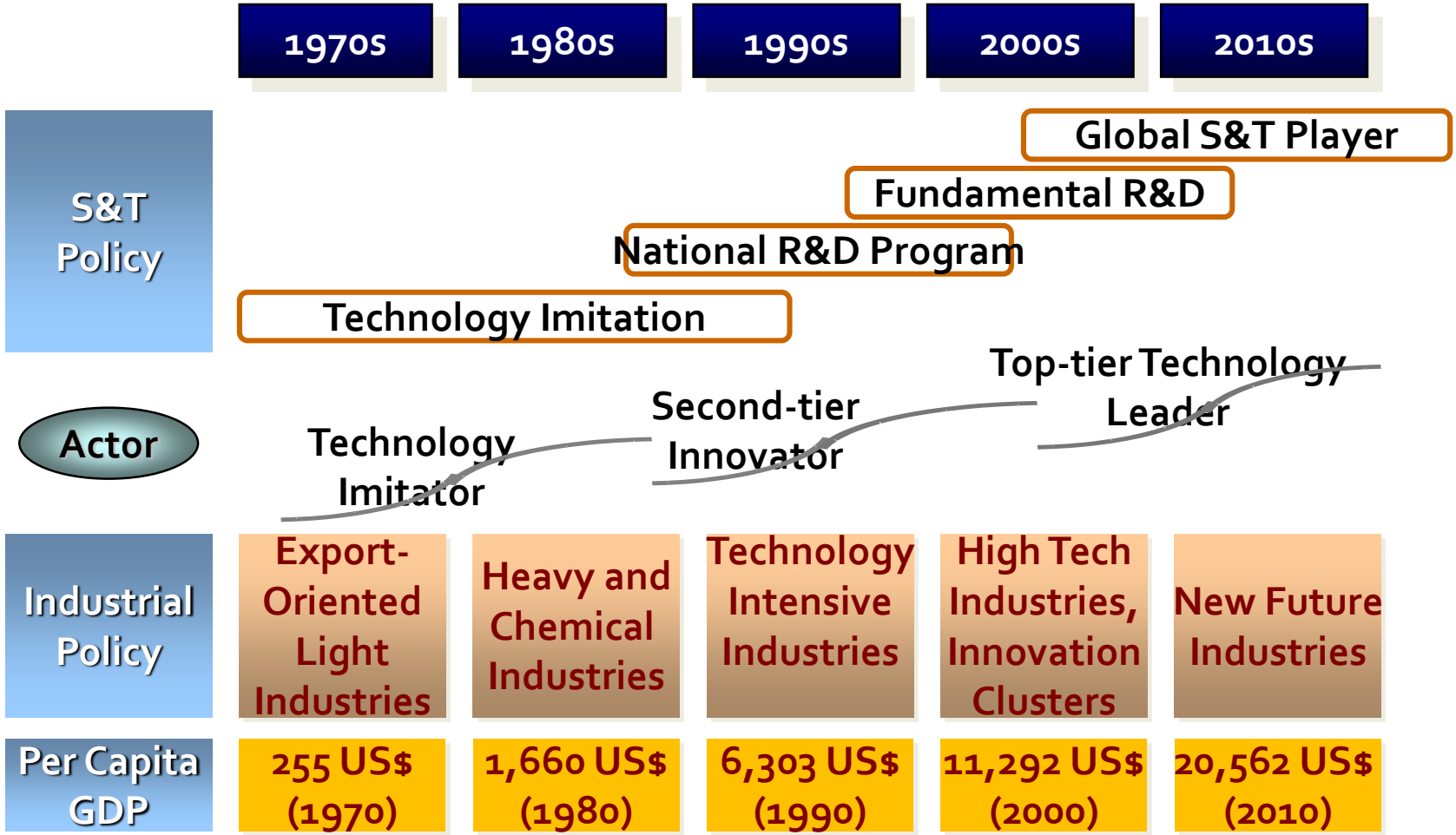
Korean War (1950~53)

Known Secret of Korea's Development: Science and Technology



Factors for national development?

- ✓ Natural Resources
- ✓ Inherited Wealth
- ✓ Geographical Location
- ✓ Overseas Aids
- ✓ Smart, hard working people
- ✓ Culture
- ✓ Learning
- ✓ Religion

SONY

First TR Radio "TR-55"(1955)

Trinitron color TV "KV-1310"(1968)

1955 **1960** **1968** **1979**

Direct view type portable TV "TV8-301"(1960)

First walkman "TPS-L2"(1979)

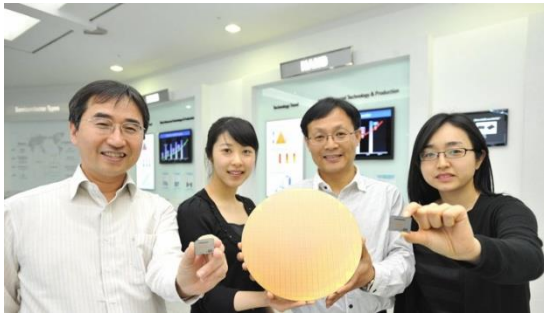
Source : http://www.sony.co.kr/handler/Common-Start?PageName=jsp/company/company/corporate_history.jsp
http://ko.wikipedia.org/wiki/%EC%9B%8C%ED%81%AC%EB%A7%A8

Samsung Electronics

Black and White TV (1972)

Refrigerator (1974)

Color TV (1976)



Wafer & Semiconductor

SMART TV UN75F8200F

GALAXY Gear with GALAXY Note 3

Source:
http://www.samsungsemiconstory.com/95, facebook.com/samsungsemiconstroy, www.samsung.com/sec

Hyundai Motors

1968 CORTINA

Produced by Hyundai after importing technology from Ford (UK) in 1968

1975 PONY

The first domestic production with independent technology

2014 GENESIS

Hyundai which started with car industry now covers steel and shipbuilding industry

Source : http://www.hyundai.com
https://www.hyundai-steel.com/
https://www.hhi.co.kr

Moving Production Base to Foreign Countries (textile, shoes…..)

South Korea during the 1970s to the 1980s

Thailand

Indonesia

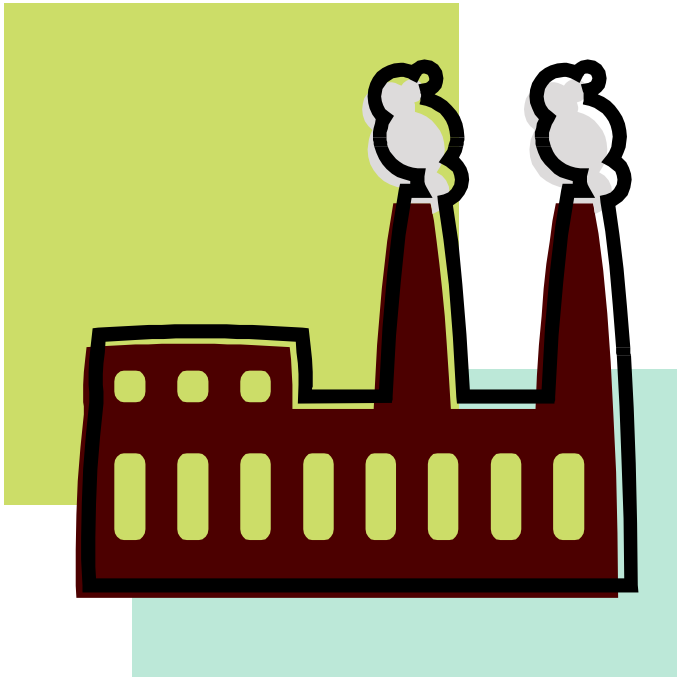
Cambodia

Source : http://www.cctoday.co.kr/news/articleView.html?idxno=529537
http://www.kookje.co.kr/news2011/asp/newsbody.asp?code=0500&key=20130821.22021194339

No technology no independence

The role of Science and Technology

- Back-bone of industry and agriculture



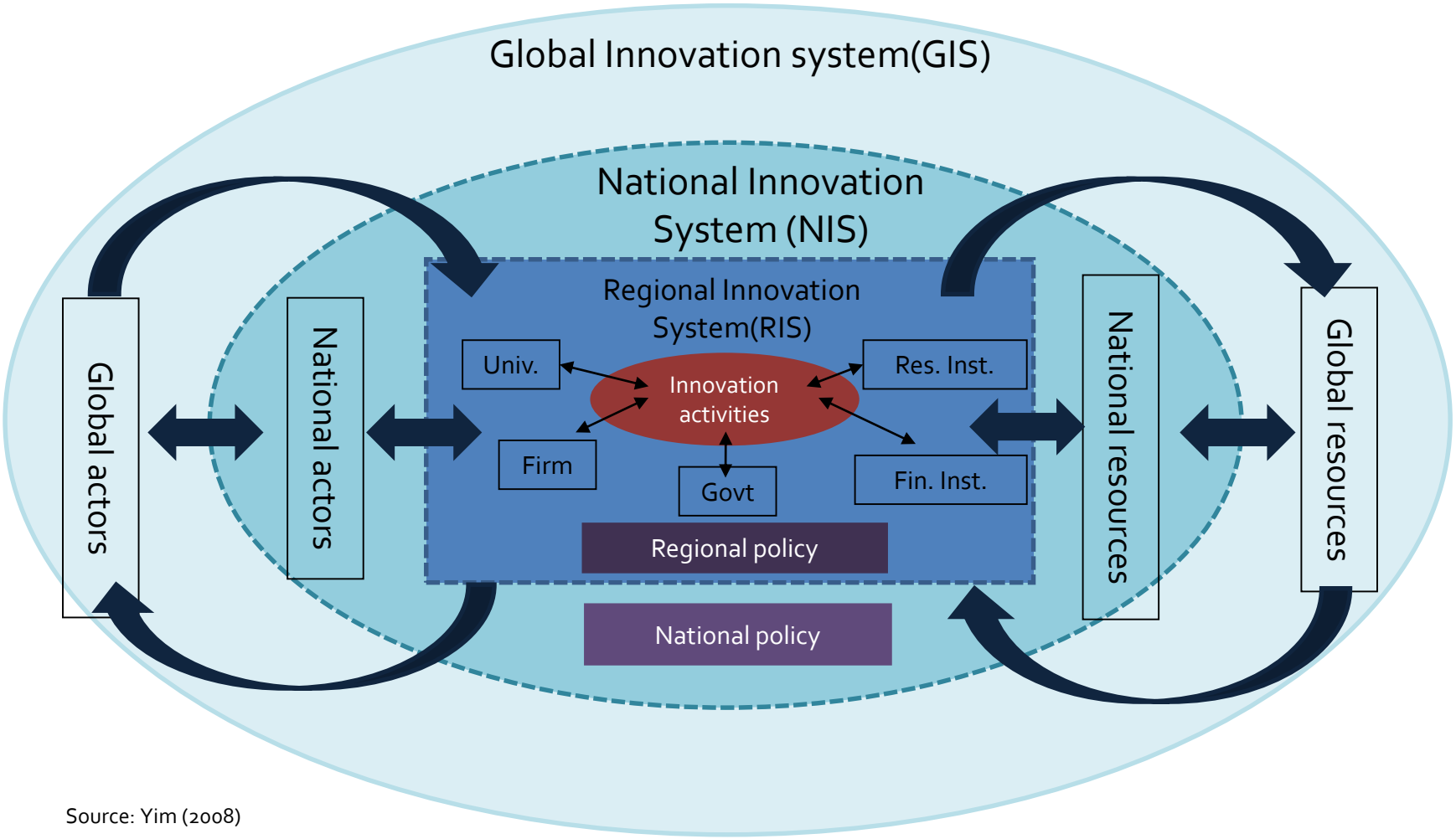
The role of Science and Technology

- Last resort for self defense

Then, how to enhance the S&T capacity?

- Increase S&T investment
- Increase STI system productivity
- Good S&T Policy, HR, Infra…. And?

Innovation systems at different levels



Source: Yim (2008)

5 Pillars for the S&T Development

Gov't

Policy

R&D Inst.

S&T Univ.

S&T Park

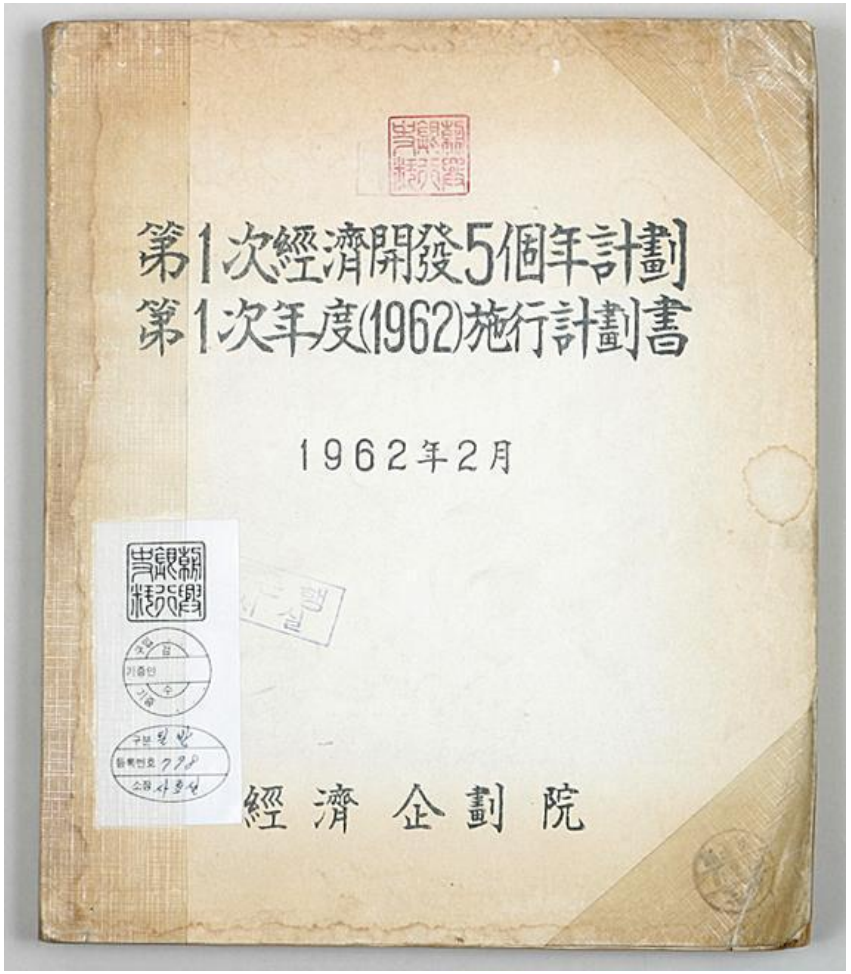
National Economic Development Plan and S&T Plan

National Economic Development Plan	S&T Comprehensive Plan	Starting Year	Finishing Year
The 1st Five-Year Economic Development Plan	The 1st Five-Year Plan for Technological Promotion	1962	1966
The 2nd Five-Year Economic Development Plan	The 2nd Five-Year Plan for Technological Promotion	1967	1971
The 3rd Five-Year Economic Development Plan	The 3rd Five-Year Plan for Technological Promotion	1972	1976
The 4th Five-Year Economic Development Plan	* Included in Economic Development Plan as 'S&T Plan'	1977	1981
The 5th Five-Year Economic Development Plan	* Included in Economic Development Plan as 'S&T Plan'	1982	1986
The 6th Five-Year Economic Development Plan	* Included in Economic Development Plan as 'S&T Plan'	1987	1991
The 7th Five-Year Economic Development Plan	* Included in Economic Development Plan as 'S&T Plan'	1992	1996

S&T Planning Continues…

National Economic Development Plan	S&T Comprehensive Plan	Starting Year	Finishing Year
The New Economy Five-Year Plan	* Included in New Economy Five-Year Plan as '**Technology Development Strategy**'	1993	1997
-	**Five-Year Science and Technology Innovation Policy**	1997	2002
-	**Five-Year Science and Technology Innovation Policy: Revised**	2000	2002
-	**Science and Technology Basic Plan**	2002	2006
-	**Science and Technology Basic Plan: Revised**	2003	2007

Promotion of Economic Development Plan



Source: National Archives of Korea

Source: Seoul Museum of History

Hard Infrastructure for S&T

Establishment of S&T Park in 1973

Spin-offs of GRIs

Establishment of KIST in 1966
(Government Research Institute)

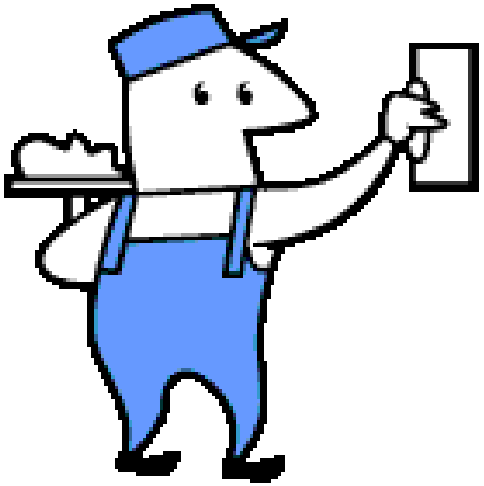
Establishment of KAIST in 1971

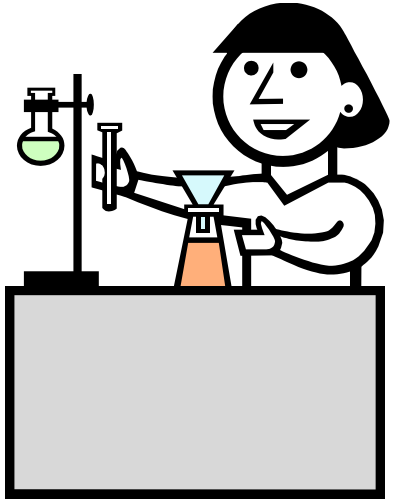
"To produce highly-qualified engineers who can lead Korean industrial development"

Characteristics:
- ✓ Independence guaranteed
- ✓ Placed under the Ministry of Science and Technology
- ✓ Curriculum designed to match the needs of industrial sector promoted by the gov't
- ✓ Emphasis on practical sessions

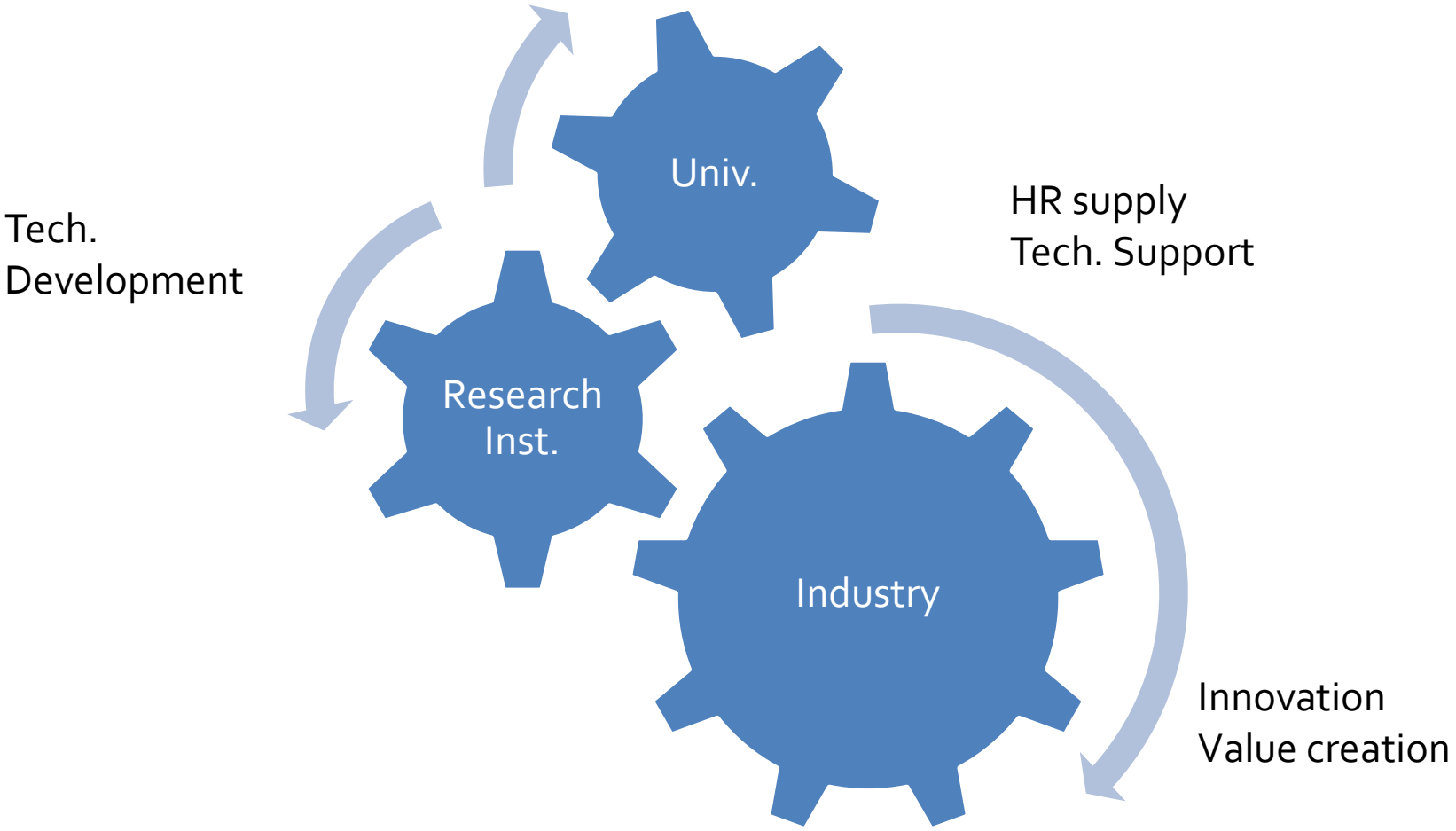
5-year Economic Development Plan
S&T Human Resources Development Policy

So, they innovate and create value





Univ. Ind. Research Inst. Linkage



World Skills Competition

Source: World Skills Korea(http://skill.hrdkorea.or.kr)

Thanking World Class Technicians

Thanking World Class Technicians

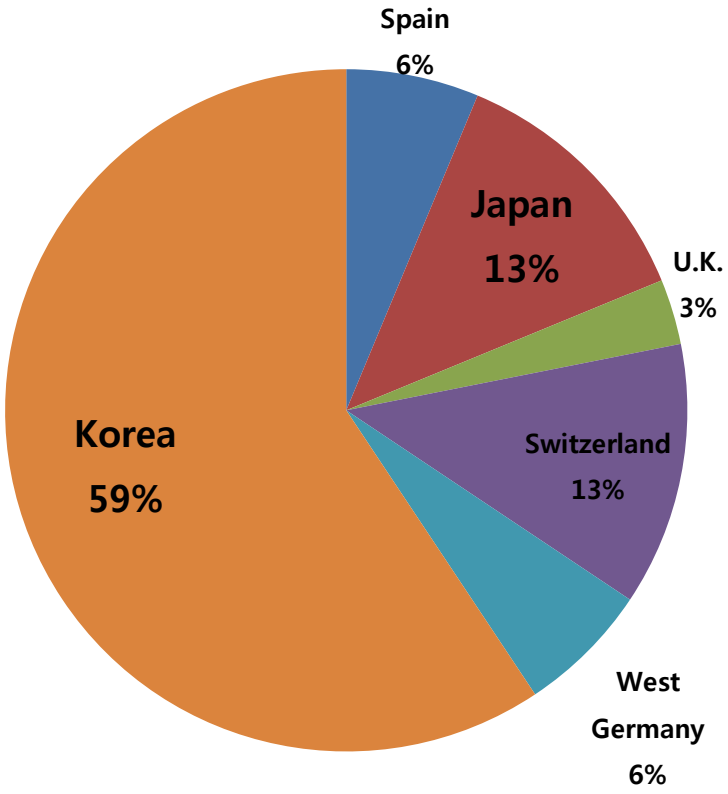
Source: National Archives of Korea ,**국가기록원**

World Skills Competition

Year	Host country	Participating country	Participating technicians	Korean Participants	1st Place	2nd Place
1950	Spain	2	24	0	-	-
1955	Spain	7	83	0	Spain	West Germany
1967	Spain	11	218	9	Spain	Japan
1973	Germany	15	281	18	West Germany	Korea
1975	Spain	17	291	25	Switzerland	Korea
1977	Netherlands	17	267	28	Korea	West Germany
1978	Korea	14	239	31	Korea	Switzerland
1979	Ireland	14	276	33	Korea	Japan
1981	U.S.A	14	266	31	Korea	Japan
1983	Austria	18	309	32	Korea	Taiwan
1985	Japan	18	307	33	Korea	Japan
1988	Australia	19	354	34	Korea	Japan
1989	U.K.	21	408	32	Korea	Taiwan
1991	Netherland	25	430	32	Korea	Taiwan
1993	Taiwan	25	425	32	Taiwan	Korea

Korea's Achievement Continues…

1st Place from World Skills Competition (1962-2014)



1995, 1997, 1999, 2001, 2003, 2007, 2009, 2011, 2013…….

- ✓ Machine assembling
- ✓ Compression molding
- ✓ Mechatronics
- ✓ Machinery design/CAD
- ✓ Welding
- ✓ Steel-frame Structure
- ✓ Automobile Self-repairing
- ✓ Electronic equipment
- ✓ Electric power control
- ✓ Information technology

…. And many more

Korean Miners in Germany and Workers in Saudi-Arabia

Source: 류연국(한국교통대 교수) in "http://blog.daum.net/yjbo802/4272"

Source: http://blog.naver.com/fkisupporter?Redirect=Log&logNo=40208531993

Policy Failure is Fatal

- Market Failure
- Government Failure
- System Failure
- Policy Failure

Challenges Ahead

- Fourth Industrial Revolution
- Creativity and openness
- From government driven to private driven
- STI system upgrade
- Demand for inclusive development

Challenges Ahead

Fourth Industrial Revolution

The 4th Industry Technology

AlphaGo

AI

Internet of Things

Autonomous Robotics

Augmented Reality

3D Printing

Autonomous Vehicle

Lessons from Korean experience

- CEO of nation: Political Willingness
- Policy Think-tank is important
- Excellence in planning and managing the Gov't S&T action program
- Education and Human Resource Development
- Gradual Development: Long-term oriented plan
- Not only S&T, it is about innovation
- Innovation go together with industry

Then plan and implement!

- First, comes S&T policy
  - Good S&T Think-Tank and experts
- Then, S&T infrastructure
  - World Class Public research Inst.
  - World Class S&T specialized Univ.
  - World Class S&T Park
  - Public acceptance and innovative culture
- Third, R&D investment
- Last not the least, technology commercialization

Areas for Collaboration

Science, Technology and Innovation Policy

- Human Resource Dev.
- S&T Think-tank
- STI Master Plan and Roadmap

Nation/Industry R&D Program

- Public, University, Private sector R&D
- Management of R&D programs
- I-U-R Cooperation

Technology Transfer & Commercialization

- Incubation
- Tech Transfer
- Tech Commercialization

S&T Infra.

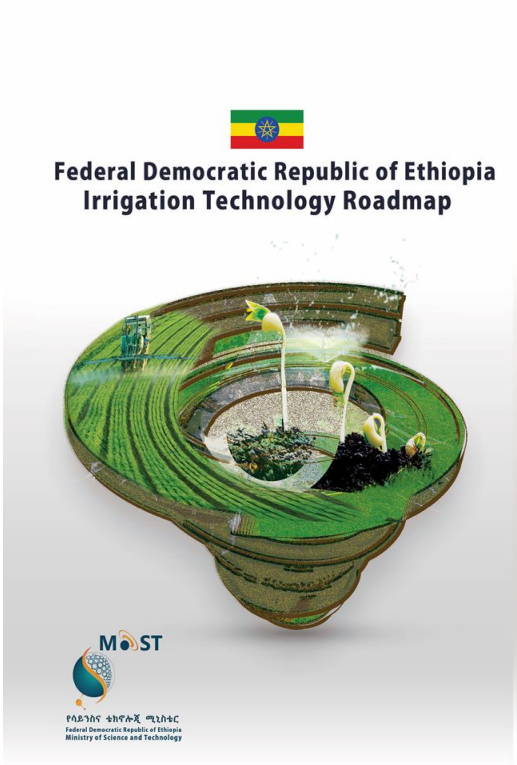
- National Innovation System/ Regional Innovation System
- Public Research Institute
- S&T University
- STI Park (management & operation)
- Venture Capital
- Innovative Culture / Public Awareness
- STI Promotion Organizations

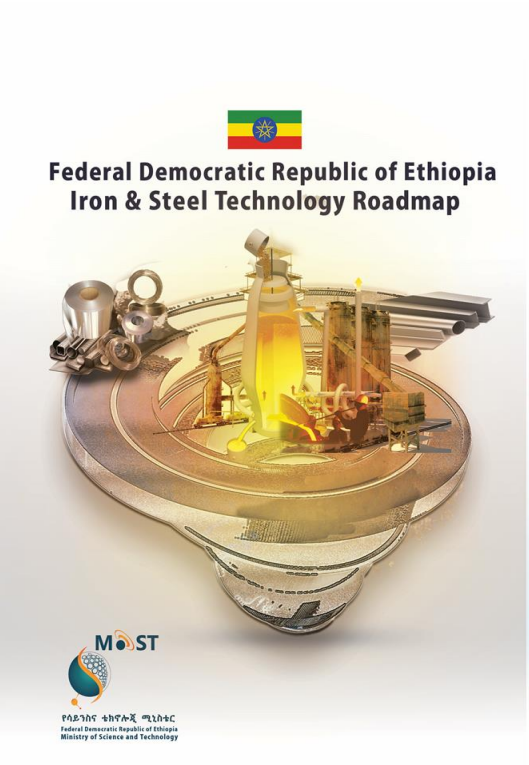
Areas for Collaboration

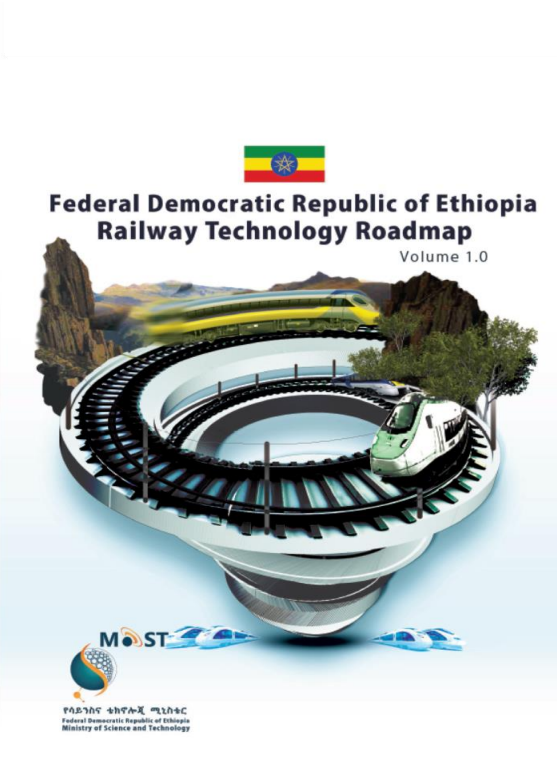
- Sharing of Science and Technology Policy
- Customized & Demand Driven Training
- Master Plan and Capacity Building for Science and Technology Park, S&T University

Areas for Collaboration

- National Technology Roadmap and Action Plan







Livestock	Crop	Irrigation	Textile	Environment	Fertilizer	Cement	Chemical	Meat	Sugar
Coffee	ICT	Leather	Railway	Pharmaceutical	Road	Construction	Metal	Mine	Energy

Thank you!