

Science & Technology Policies and Innovation System in Korea

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I. Current Status of Science and Technology Policy

1. Korea's Economic Growth

Korea achieved economic growth through a labor-intensive industry in the 1960s and massive investment of a capital-intensive industry, such as the heavy chemical industry in the 1970s. Increases in wages, however, caused Korea to lose comparative advantage. Therefore, Korea tried to promote high advancement of its industrial structure through the development of a technology-intensive industry in the 1990s and the technology and knowledge-intensive industries in the 2000s.

Concerning Korea's economic growth factors, analysis shows that the contribution of the labor and capital input and the technical innovation to economic growth increased from 55.1% and 12.8% in the 1970s to 37.2% and 55.4% respectively in the late 1990s.

2. Science and Technology Policy

Positive and negative opinions coexisted in Korea's science and technology policy. Internationally, Korea's science and technology policy starting from the 1960s was evaluated as being excellent in achieving export-led economic growth through the import, assimilation, improvement and its own development of technology. Domestically, however, it is said that frequent change of science and technology policy by a repetition of ups and downs according to sovereign power and the loss of many opportunities.

Table 1 Overview of Korea's Industrial Development and R&D Policy

	1960s	1970s	1980s	1990s	2000s
Sources of Economic Growth	Labor-intensive industries	Capital-intensive industries	Technology-intensive industries	Advanced technology-intensive industries	Knowledge & information-based industries
Development of Technology	Import-Assimilation	Import-Improvement	In-house R&D	Diffusion through R&D	Growth through R&D
R&D Policy	Establishment of KIST	Establishment of GRIs	Promotion of Industry-GRI Linkages	Promotion of Industry-Univ. Linkages	Establishment of Industry-Univ.-GRI Linkages
Policy Issues	Human Resources Development	Security of R&D Facilities	Expansion of R&D Facilities	Coordination of R&D Policy	Advancement of S&T Capability
Level of Achievement	High	High	Mid	Mid to High	High

3. National R&D Coordination System

By the mid 1980s, the overall coordination system of national R&D programs as a policy of encouraging national science and technology focused on setting the direction of national science and technology policy, including strategic R&D investment and expansion of R&D investment, etc. Until then, overall coordination system was not strongly necessary because the national R&D system was not complex and also conflict of interest was not serious.

From the beginning of 1990s, the national R&D system became varied. There was a need for an overall coordination system for national R&D programs with the promotion of specific national R&D projects and policy of ministries.

Responding to these phenomena, the government revised the Science and Technology Promotion Law; reorganized the Expert Subcommittee, which was under the Overall Science and Technology Deliberative Committee; and increased the sessions in 1991. Owing to such problems as features and conditions of the overall coordination system, however, it was not easy to obtain the desired results.

The Overall Science and Technology Council and Ministerial Council on Science and Technology are science and technology policy mediation organizations that have legal rights.

The Ministry of Science and Technology has been responsible for supporting the two organizations as the competent major science and technology ministry.

Based on the Science and Technology Framework Law that was enacted in 1999, the National Science and Technology Council was founded. National R&D projects are coordinated by the Council through deliberating, mediating, surveying, analyzing, and evaluating national science and technology policy and R&D projects. This was to improve efficiency and productivity of the national R&D projects, and optimally distribute limited R&D resources.

II. Current Status of National R&D System

1. Types of National R&D Administration System

(1) Decentralized Type

In the decentralized type, public research institutes are under each ministry's jurisdiction. Therefore, R&D programs are planned by each ministry and conducted by public research institutes. The nation performs the role of deliberating and coordinating national R&D programs.

(2) Centralized Type

Public research institutes are intensively positioned under the jurisdiction of one ministry in the centralized type. The planning and priority setting of national R&D programs are made at the national level. Public research institutes perform the R&D projects of their own areas.

(3) Centralized Delegation Type

This type put public research institutes intensively under the delegated agencies of R&D management, such as research councils, deliberative councils, etc. Therefore, they are empowered to allocate national R&D resources by the nation.

(4) Decentralized Delegation Type

This type is a mixture of the decentralized coordination type and centralized delegation type. This one has a dual operating system in which each ministry manages and allocates national R&D funds while research councils provide them.

Based on this, the above-mentioned four types are compared and analyzed as follows.

Classification	Decentralized Type	Centralized Type	Decentralized Delegation Type	Centralized Delegation Type
Location of Public Research Institutes	Distributed into Every Ministry	Concentrated on one Ministry	Concentrated on Research Council	Operation & Management: Research Council R&D: Each Ministry
Allocation of National R&D Resources	Controlled by the Committee	Planned on the national scale	Delegated to each research council	Controlled by the Committee
Example	USA, Japan	Italy, Canada	Germany, England	Korea
Coordination Organization	(USA) NSTC/ OSTP (Jan) CGST	-	(G) BMBF/BMWi (UK) CST/ OST	NSTC/ OSTI

2. Korea's Revision of the National R&D Administration System

(1) Development Stage of Korea's National Innovation System

First Generation: Centralized National Innovation System (1970s-1980s)

- Promotion of national R&D programs performed only by the Ministry of Science and Technology
- Low level of R&D programs by other ministries

Second Generation: Decentralized National Innovation System (1990s)

- Imitated and Isolated type National Innovation System
- Decentralized promotion of R&D Projects in each ministries

Third Generation: Coordinated National Innovation System

- Creative national innovation system with innovation networks
- Promotion of science and technology policy and national R&D programs based on national development strategy

(2) The New Roles of the Ministry of Science and Technology

The MOST was elevated to the office of Deputy Prime Minister in 2004. The new roles of the

new MOST is planning and evaluation on science and technology policy and R&D projects with the national innovation system to increase R&D budget, to improve investment efficiency, to secure national science and technology infrastructure, and to develop R&D culture.

<Dispersion Empowerment Coordination Type: 2004>

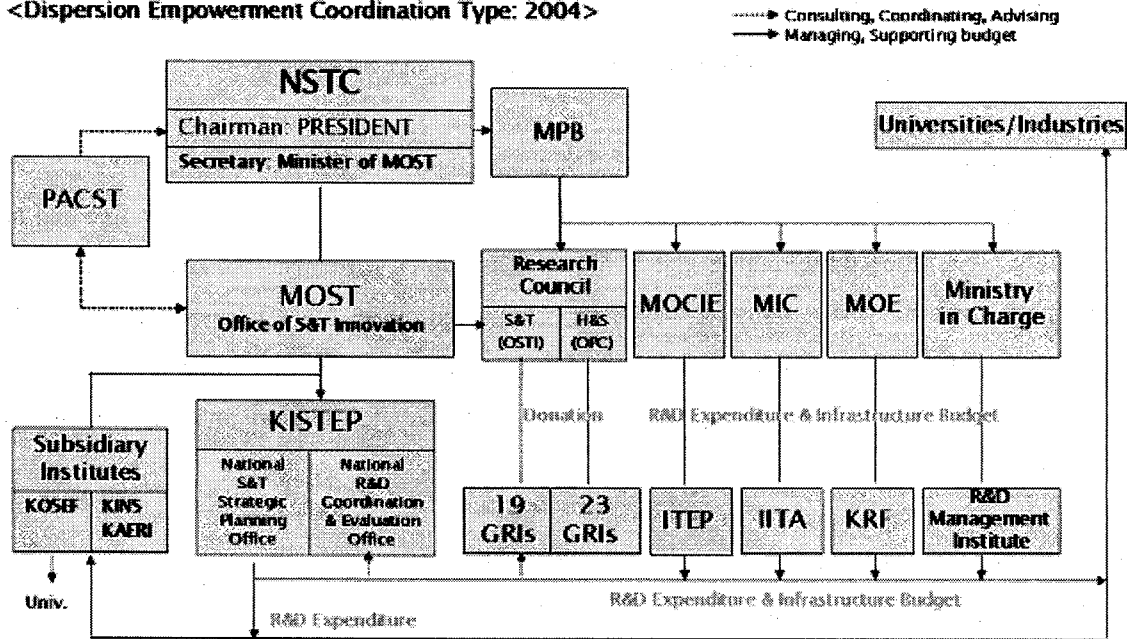


Figure 1 National Science Technology R&D System

Table 3 Roles of R&D-related Ministries

Object	Related Ministries	Ministry of Science and Technology
Ministry of Finance and Economy	Generalize and Control National Economic Policy	Generalize and Control R&D related Policy
Ministry of Education and Human Resources Development	Cultivate human resources to satisfy the supply <Common> Constitute Conference Organization between MST and Human Resources Development Council, establish and control supply and demand plan of S&T human resources, MST takes charge of final approval	Generalize and Control S&T Human Resources Supply and Demand Policy
Individual Execution Ministries such as Ministry of Commerce, Industry and Energy	Execute concerned national R&D project of each department	Control, Plan, and Evaluate National R&D Project
Ministry of Planning and Budget	Decide the total amount of budget needed for national R&D project	Decide and distribute R&D budget by departments and research programs

3. Strengthening Overall R&D Coordination of the NSTC

(1) Reinforcement of Overall Coordination by R&D Investment Strategy

The National Science and Technology Council(NSTC) should strengthen overall R&D coordination through R&D investment strategy and planning. Based on the evaluation results of national R&D programs, the R&D budget will be allocated and coordinated.

(2) Setting Priority of R&D Based on National Strategic Objectives

To support efficiently the Council's deliberation, a Working Coordination Committee and an Operating Committee for Planning and Evaluation, in which officials from related ministries participate and offer their opinions, has been established. With the establishment of a joint planning group and committees by fields, departments and subdepartments, professional from private expert support can be required for overall R&D coordination and can always be provided.

(3) Reinforcement of Deliberation for National R&D Budget

The government has institutionalized that R&D priority setting of the NSTC can be directly reflected in the national R&D budget. Based on the mid and long-term S&T plans, the budget of national R&D projects is coordinated through the NSTC. The right for budget allocation is given to the research councils to secure their independence and autonomy.

4. The overall coordination system of science and technology policy

(1) Organization and Function

To coordinate National Science and Technology Policy, comprehensively there are National Science and Technology Council, Presidential Advisory Council for Science and Technology, the Ministerial Council Related Science and Technology, the Office of Science and Technology Innovation, etc.

National Science and Technology Council(NSTC) is the supreme decision-making organization with the President as chairman, Minister of Science and Technology(Deputy Prime-minister) as vice-chairman, and Vice Minister of Science and Technology Innovation as executive secretary.

Presidential Advisory Council on Science and Technology is the advisory and policy studies

with the President as chairman, Deputy Prime-minister of Science and Technology as vice-chairman, Presidential Advisory Council for Science and Technology as executive including 27 private experts.

Ministerial Meeting on Science and Technology is consisted of Minister of Science and Technology as chairman and 15 members of the cabinet. It holds a meeting every months to coordinate political issues.

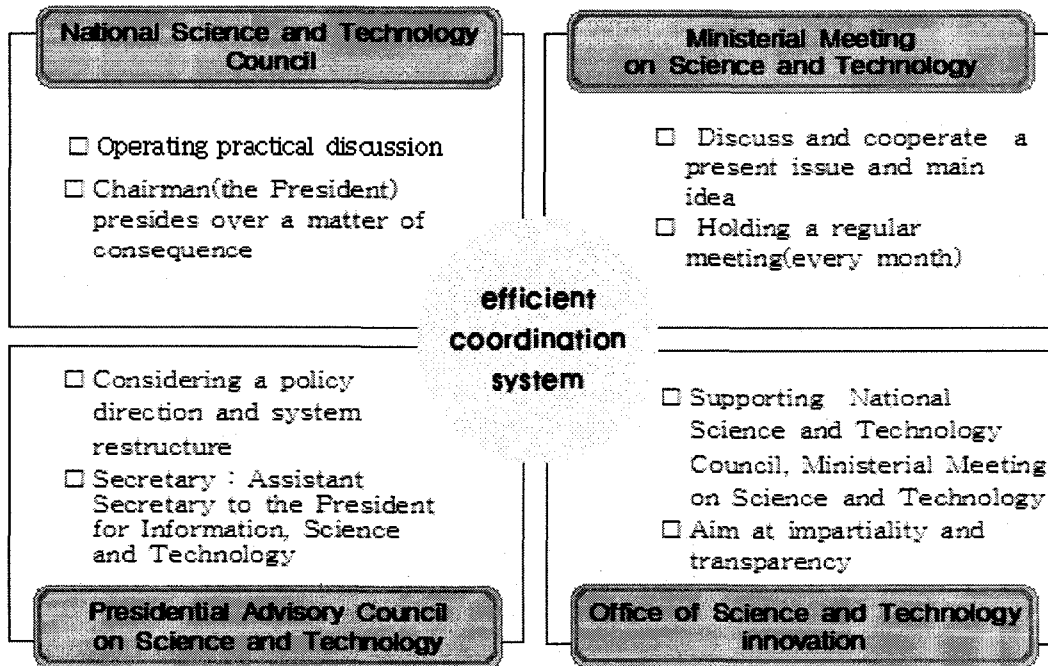


Figure 2 Overall Coordination System

(2) Organization of the Office of Science and Technology Innovation(new)

The Ministry of Science and Technology(Deputy Prime-minister) has two Vice-Ministers for generalizing all work under the Minister of Science & Technology and the Science and Technology Innovation to carry out work of National Science and Technology Council.

Main mission of the Office of Science and Technology Innovation are an establishing a medium- and long-term R&D investment plan and strategic allocation and coordination of R&D budget, overall plan of national R&D programs, overall coordination of policy of fostering S&T.

III. Policies of National Innovation System

1. National Innovation System

(1) Backgrounds

Development of science and technology is essential to cope with the rapidly changing international survival environment and to jump to a higher level. To actively respond to the changes in domestic and overseas economic conditions in the 21st century and achieve a per capita GDP of \$20,000, "Establishment of a Science and Technology-Oriented Society" with higher R&D budget is needed.

(2) Policies of National Innovation System

To achieve five major policy objectives of an S&T oriented society, the Korean government set thirty tasks to be performed as follows.

Table 4 National Innovation System Policies and Tasks

Policy Objectives	Tasks
Innovation of National R&D System	<ol style="list-style-type: none"> 1. Raise the Efficiency of R&D Investment 2. Establish an Efficient S&T Administrative System and Advanced Policy Coordination System 3. Raise the Efficiency of the Private R&D Support System 4. Improve the Research Committee System. GRIs 5. Develop an Integrated IT System for National S&T
Cultivate and Employ Excellent Science and Technology Human Resources	<ol style="list-style-type: none"> 1. Increase the Opportunities for Appointment to Public offices by Scientists and Engineers 2. Promote Entrance of Excellent Students into the Department of Technology 3. Innovate Engineering Education 4. Innovate Science Education in elementary, middle, and high schools 5. Improve the Military Service System to raise the Department of Technology 6. Strengthen the Reward System for Science Technicians 7. Improve the Technology Qualification System, such as Technician License 8. Cultivate Essential Human Resources in Every field of Science and Technology 9. Create Technology-based Jobs

Strengthen the Foundation for Generating the Future Growth Engine	<ol style="list-style-type: none"> 1. Strengthen Innovative Foundation through Promoting Fundamental Science 2. Expand National R&D Investment 3. Develop Basic Technology and Source Technology to Expand and Improve the Future Growth Engine 4. Make an International Base of Essential Machine Parts 5. Construct Energetic Industrial Structure through Promoting Minor and Venture Enterprises 6. Promote Technological Development to Rear New Industries 7. Develop Big, Middle and Long-term Science Technology and Public Welfare Technology 8. Establish National Long-term Energy Strategic Organization
Establish a Technological Innovation and Diffusion System	<ol style="list-style-type: none"> 1. Activate Industrial-University Collaboration 2. Establish an Expanding Structure of Technological Innovation and Speed Up Industrialization for New Technology 3. Expand the Infrastructure of Industrial Technology Innovation 4. Construct a Global R&D System 5. Promote R&D Specialized Regions
Diffuse the Science and Technology Culture	<ol style="list-style-type: none"> 1. Make Science and Technology Culture an Everyday Culture 2. Establish a Science and Technology Affinitive Social System 3. Strengthen the Responsibility and Morality of Science and Technology

2. The policies of Regional Innovation System

(1) Background

To show a great effort of encouraging regional science and technology, the Systems Approach is necessary. This approach could make an innovation effort of member of regional science and technology connect with each other effectively under the close cooperation of the central government and local government.

Industrial fields and research institutes, universities located on a national scale should be connected well through Systems Approach and establish collaboration systems.

Regional Innovation System has a function to change a structure of regional industries to a structure of advanced technology-intensive industries. R&D budget of local government expanded 8.45% in 1997 into 10.47% in 2003. However it is in need of expanding more.

Table 5 R&D Budget of regional governments in Korea

(Unit: billion won)

Item	Regional governments	Central government	Regional/ Central
1997 Total budget (A)	33,174	98,330	33.74%
1997 R&D budget (B)	255	3,019	8.45%
B/A	0.77%	3.1%	-
1999 Total budget (C)	32,944	84,281	39.09%
1999 R&D budget (D)	216	3,069	7.03%
D/C	0.66%	3.64%	-
2001 Total budget (E)	42,312	94,125	44.95%
2001 R&D budget (F)	325	4,106	7.92%
F/E	0.77%	4.3%	-
2003 Total budget (G)	54,064	1,114,831	48.49%
2003 R&D budget (H)	555	5,299	10.47%
H/G	1.03%	4.75%	-

Source: Chung et al (1997, 1999), MOST(2002, 2003)

(2) Policies of Regional Innovation System

The basic plans of Regional Innovation System started in 2004 are fostering local S&T innovation potential and establishing a regional innovation network, high regional industry structures and raising the quality of the local residents life, leading role of local government with a strong support of the central government.

The purpose of establishing regional innovation system is RIS having a global competitive power and sustainable national development.

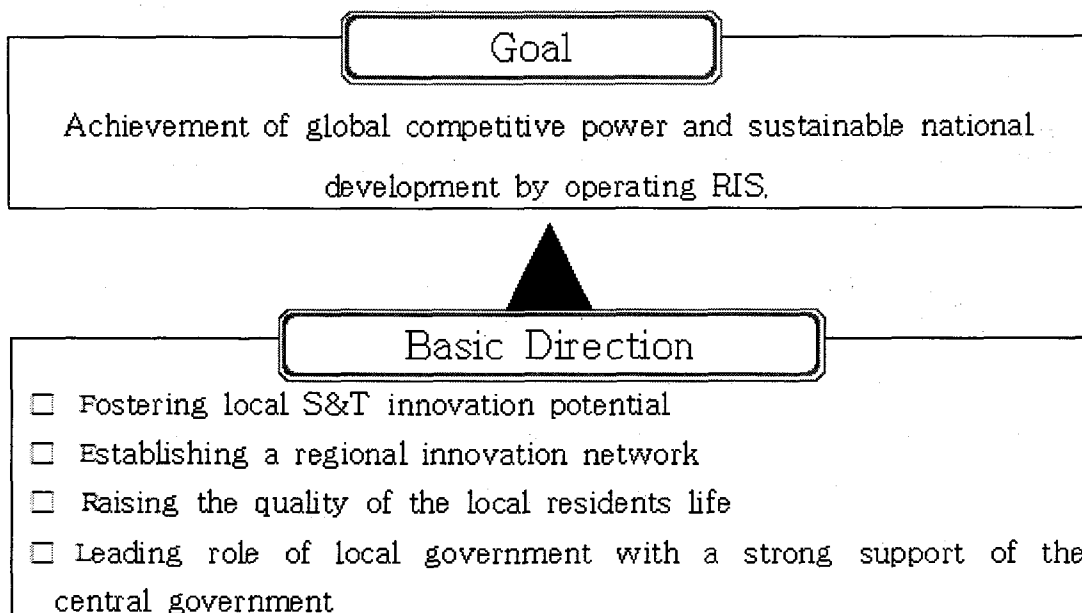


Figure 3 RIS Promotion Plan

3. National R&D Management System

(1) R&D Planning, Evaluation and Management System

To improve National R&D Management, the evaluation and using of Spin-off and Industrialization has been strengthening through Planning, Execution and Management, Results evaluation and Analysis.

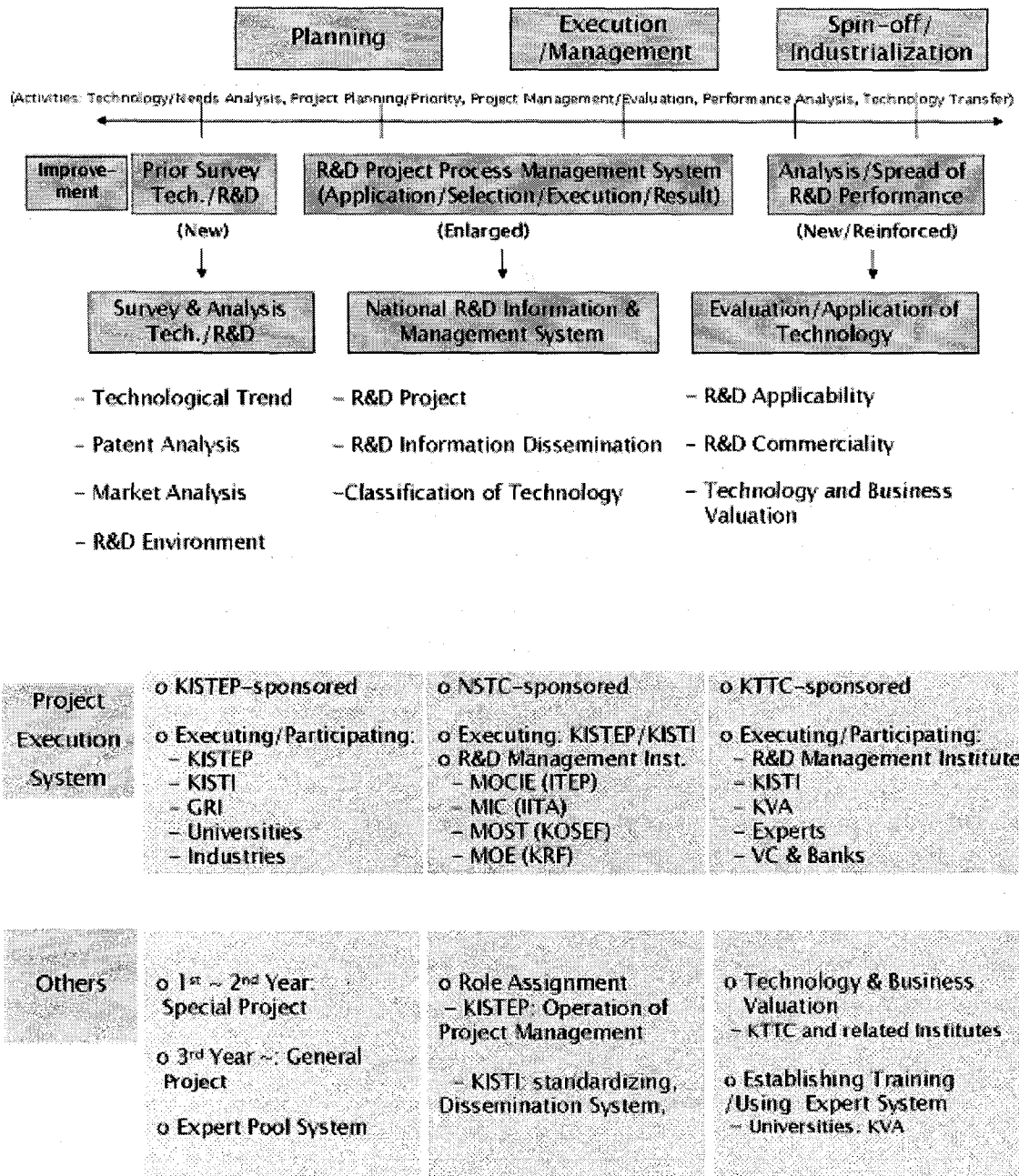


Figure 4 R&D Planning, Evaluation and Management System

(2) National Technology Information System(NTIS)

To manage R&D efficiently, the information on transfer and expand stages are being established according to a research plan and setting task, allocation of R&D budget, interim and final stages, the usage. To do this, \$ 0.1 billion will be contributed for completing NTIS by 2010.

After completing NTIS, human resources, research tools and facilities, research project information, technical trend and results information will be used. These information maximizes growth for efficiency of national R&D. After considering NTIS, e-R&D, technology financial information etc., e-Science system is expected to be established by 2015.

< Acronyms >

NSTC	National Science & Technology Council
PACST	Presidential Advisory Council on Science & Technology
MOST	Ministry of Science & Technology
ACPIST	Assistant Secretary to the President for Information, Science & Technology
OSTI	The Office of Science & Technology Innovation
OPC	The Office for Government Policy Coordination
MPB	Ministry of Planning & Budget
MOCIE	Ministry of Commerce, Industry and Energy
MIC	Ministry of Information & Communication
MOE	Ministry of Education & Human Resources Development
KISTEP	Korea Institute of Science & Technology Evaluation and Planning
ITEP	Korea Institute of Industrial Technology Evaluation & Planning
IITA	Institute of Information Technology Assessment
KRF	Korea Research Foundation
KOSEF	Korea Science & Engineering Foundation
STEPI	Science & Technology Policy Institute
KAIST	Korea Advanced Institute of Science & Technology
KIST	Korea Institute of Science & Technology
KRISS	Korea Research Institute of Standards & Science
KISTI	Korea Institute of Science & Technology Information
KTTC	Korea Technology Transfer Center
KVA	Korea Valuation Association

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