

# Comparison Analysis of Science and Technology Council between Korea, USA, and Japan

Daekook Kang, Wooseok Jang, Jeonghwan Jeon

**Abstract**—As Korea government has expanded the budget for the national research and development business, the need for the installation of institute taking a role of deliberation, coordination, and operation of research development business and its budget has been increased continuously. In response to the demands of the times, recently, the National Science & Technology Council (NSTC) was installed. However, to achieve a creative economy more efficiently, the fundamental introspection on the current state of the national administration system of science and technology in Korea should be needed. Accordingly, this study, firstly, analyzes the function and organizational structure of NSTC in Korea. Then, this study investigates the current state of the National Science and Technology Council in main world countries. Lastly, this study derives some implications based on the comparison analysis of the current state of the National Science and Technology Council between Korea and these countries. The present study will help in finding the way for the advancement of the NSTC in Korea.

**Keywords**—Comparison analysis of Science and Technology Council, CSTP, National Science and Technology Council in Korea, Operating system of NSTC.

## I. INTRODUCTION

RECENTLY, as science and technology have been of vital importance, Korea government has expanded the budget for the national research and development business [1], [2]. Under such circumstance, the balanced management of national research and development business based on the sector diversification should be needed. It stems from not only the importance of national research and development business but also the huge scale of the national research and development business. To resolve this issue, the need for the installation of institute being responsible for deliberation, resolution, and adjustment of national research and development business has been increased.

Reflecting this need, Korea government installed the *National Science & Technology Council (NSTC)* which was an institute being responsible for deliberation, resolution, and adjustment of national research and development business in 2013. Due to the dissolution of Ministry of Science and Technology and Ministry of Information and Communication in Korea, it is expected that the NSTC will play a role as a new control tower for the national science and technology.

Daekook Kang and Wooseok Jang are with the Department of Industrial Engineering, Seoul National University, Daehak-dong, Gwanak-gu, Seoul, 151-744, Republic of Korea (phone: 82-10-3171-0670; 82-10-2080-4921; e-mail: daekooky@snu.ac.kr himono0219@naver.com).

Jeonghwan Jeon is with the Department of Industrial and System Engineering, Gyeongsang National University, Gajwa-dong, Jinju-si, Gyeongsangnam-do, 660-701, Republic of Korea (phone: 82-10-3033-0170; tel: 82-55-772-1704; e-mail: jhjeon@gnu.ac.kr).

Even though the NSTC was installed newly; however, there is a constant need for the serious introspection on the current state of the national administration system of science and technology. This is because that the demands of the times for the national administration system of science and technology has been changed to involve not only the development research for the pursuit of profit but also the basic research for public business. In this environment, vertical regulations-based control tower which was successful in the past is no longer a sustainable alternative to contributing the development of the national science and technology. Thus, to promptly meet these needs of the times, the current state of the national administration system of science and technology in Korea should be investigated thoroughly.

In response to the paradigm of an innovative economy, administration system of science and technology in Korea should be switched by considering the age of post catch-up regime and creative economy. To conduct the serious introspection on the current state of the national administration system of science and technology in Korea, the comparison analysis of the current state of National Science & Technology Council between Korea and the main world countries can be an appropriate approach to derive fruitful implications.

Accordingly, the present study aims to contribute to the advancement of the NSTC in Korea in three ways:

1. To analyze the function and organizational structure of NSTC in Korea
2. To investigate the current state of the National Science & Technology Council in USA and Japan
3. To derive implications based on the comparison analysis of the current state of the National Science & Technology Council between Korea, USA, and Japan

The remainder of this paper is organized as follows. Section II overviews the operating system of NSTC in Korea. Then, in section III shows the results of an investigation of the current state of the National Science & Technology Council in USA and Japan and implications based on the comparison analysis. Finally, Section IV concludes the paper with contributions and future research.

## II. OPERATING SYSTEM OF NSTC IN KOREA

### A. Overview of NSTC

The NSTC was installed as a national science technology planning tower to achieve a creative economy in 2013. The major mission of the NSTC is firmly to establish the vision for national S&T development.

The chairman in NSTC consists of co-chairman of the Prime Minister and the private sector. In addition, the 13

Ministers of a related government department participate as government delegates and private delegates and experts are also participated.

### B. Major Functions of NSTC

The NSTC plays a role in terms of three major issues as follows.

1. Deliberation on issues such as coordination of labor policy and local technology innovation policy related to innovation and major policies of science technology and industrialization
2. Coordination of research development plan and business
3. Operation of research development budget

### C. Organizational Structure of NSTC

The NSTC is composed of a plenary session, a steering committee, 7 expert committees, 2 special committees, and 2 consultation committees as shown in Fig. 1.

Specifically, first, the plenary session deliberates issues related to establishment and coordination of major policies for science technology and efficient operating system of the national R&D business budget. Second, the operating committee plays the role of practical advice for issues related to science technology policy and pre-examination on the deliberation and decision matters prior to the plenary session. Third, expert committee takes the role of review and coordination of R&D budget in each field and conducts decision of investment direction and propriety for major R&D businesses, connection and coordination between businesses, distribution, and coordination of R&D budget, etc. Fourth, the special committee carries out temporary and intensive discussion on special issues among deliberation matters of committee. This special committee is composed of the special committee on Civil-Military Technology Cooperation and the special committee for multi-department technology collaboration. Lastly, the consultation committee takes a role of consultation of each field policy for promoting fundamental research and local science technology.

## III. CURRENT STATE OF NATIONAL SCIENCE & TECHNOLOGY COUNCIL IN OTHER MAJOR COUNTRIES

### A. Japan (Council for Science and Technology Policy)

Due to increasing complexity of science policy, the mechanisms for evaluating the science and technology policy (S&T Policy) weak in Japan [3]. Thus, in 1995, Japan government developed an integrated government S&T policy and successive 5-years S&T Basic Plans which defined the detailed objective and overall priorities of policy for each year. However, Japan needs to construct the strong organization for managing S&T policy to conduct successive S&T Basic Plans or other S&T policies. Therefore, as the part of the task of reforming administrative in 2001, the Council for Science and Technology Policy (CSTP) which is in Cabinet Office was organized and it has a stronger power of decision than before. It has had the leading role in developing overall S&T policy, including completing the S&T Basic Plans and evaluating other detail agenda related basic S&T

policy. In addition, other members in Cabinet Office such as Minister of State for S&T Policy also support CSTP to formulate important policies and overall coordination of Ministries.

The CSTP chaired by the Prime Minister is constituted by six Ministers, seven executive members and head of an affiliated organization. Ministers mainly deliver the result of the council and reflect the result in establishing their policies. Executive members, who are eminent persons from various academic or industrial worlds, mainly consult the S&T policy through their professional knowledge and opinion. Table I shows the membership of CSTP.

TABLE I  
MEMBERSHIP OF CSTP

Member	Position
<b>Chair</b>	Prime Minister of Japan
	Chief Cabinet Secretary
	Minister of State for Okinawa and Northern Territories
<b>Minister (6)</b>	Minister of Internal Affairs and Communication
	Minister of Finance
	Minister of Education, Culture, Sports, Science and Technology
	Minister of Economy, Trade and Industry
	Former Senior Corporate Adviser, MITSUBISHI
	Professor Emeritus, Tohoku University
<b>Executive member (7)</b>	Chairman of the board, Toyota Motor Corporation
	Director, Advanced Institute for Materials Research, & Mathematics Institute
	Representative Executive Officer, Hitachi, Ltd
	Professor, The University of Tokyo
	President, Osaka University
<b>Head of an affiliated organization</b>	President of Science Council of Japan

The CSTP convenes once every month as a rule. The main function of CSTP can be summarized as follows:

1. Investigate and deliberate basic S&T policies
2. Evaluate main key R&D projects in Japan
3. Investigate and deliberate the allocation of government expenditure and human resources for S&T policies and projects
4. Make a total coordination between various S&T policies in various departments

Only 14 members; however, cannot conduct all main functions of CSTP, so a number of other organization members, expert committees, and working group support to conduct them. Fig. 2 shows overall organization related S&T policy in Japan. This Fig. 2 includes the organization of CSTP and main expert committees in CSTP.

Like sub-committees of NSTC in Korea, expert panels are specialized to consider the policy related their fields from all points. Also, they provide professional information such as information for S&T policy and information for recommended evaluation criteria. They meet the Minister CSTP executive members about once a week and consult the direction of S&T policy or other projects. Expert panels are changed or re-organized according to circumstance and S&T policy line of

Japan. In 2014, five expert panels are operated in order to assist the main function of CSTP. Table II shows the objective and main roles of five expert panels [4].

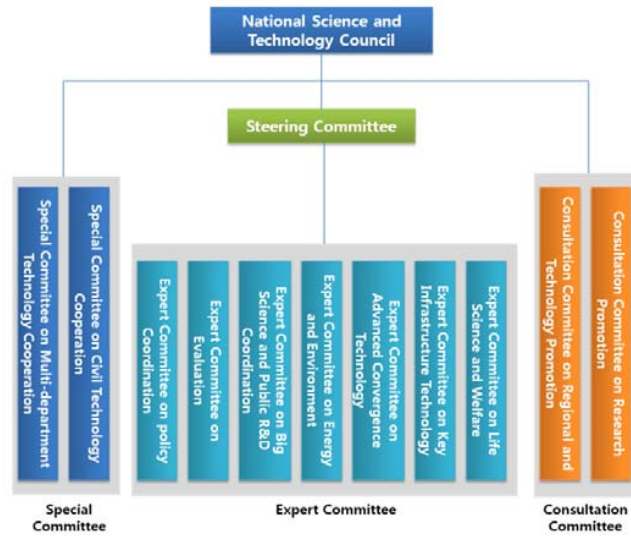


Fig. 1 Organizational structure of NSTC

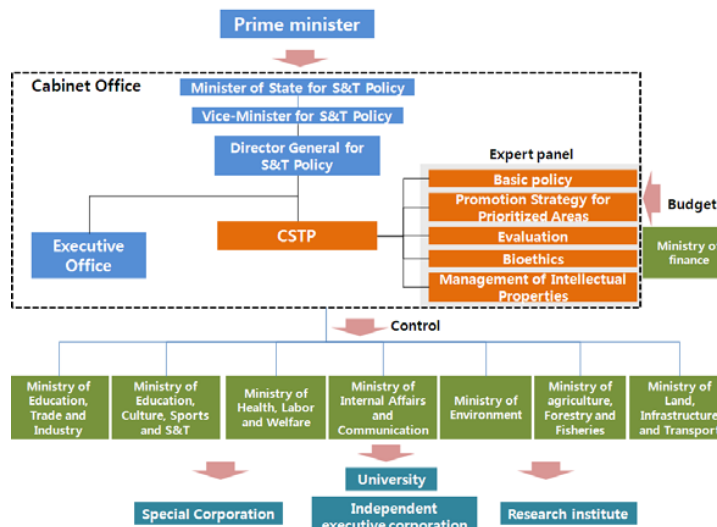


Fig. 2 Overall organization related S&T policy in Japan

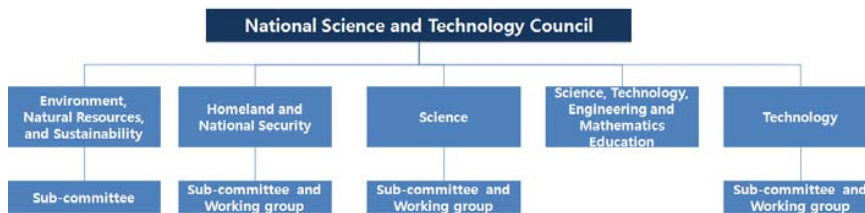


Fig. 3 Organization of NSTC in the US

*B. U.S (National Science and Technology Council)*

In later 1990s, U.S government was confronted with some problems for establishing and deliberating S&T policy. First, S&T policy was becoming more complex because many

policies can be established by the situation of federal governments, especially, from the start of increasing deficit of federal governments. Second, coordination between departments of US was needed to deliberate the S&T policy

because one S&T policy can cover the range of several departments.

To overcome this problem, U.S government strengthens the authority of National Science and Technology Council (NSTC) in order to function as a control tower for S&T policy in the US. It has had the leading role in coordinating S&T policy across Federal research and enterprise development and evaluating S&T policy to strengthen the international competitiveness of science and technology. In addition, it has made national goals for overall Federal science and technology investments and allocations in broad areas.

TABLE II  
FIVE EXPERT PANELS OF CSTP

Expert panel	Objective	Main roles
<b>Expert Panel on Basic Policy</b>	To investigate and measure the basic S&T policy	Constructing the S&T Basic Plan Promoting the 3rd S&T Basic Plan
<b>Expert Panel on Promotion Strategy for Prioritized Areas</b>	To investigate the promotion strategy for four areas (life science, ICT, environmental science, nanotechnology).	Determining the direction of four prioritized area Determining priorities in the allocation of resources for four prioritized area
<b>Expert Panel on Evaluation</b>	To obtain an effective and efficient allocation of resource for S&T policy	Conducting overall evaluation of the government funded R&D Evaluating nationally important R&D
<b>Expert Panel on Bioethics</b>	To respond to the development of the life science	Making guideline for utilization of human stem cells, embryo and other life components
<b>Expert Panel on Management of Intellectual Properties</b>	To increase international competitiveness through intellectual property	Constructing strategies for protection and utilization of intellectual property

The membership of NSTC, chaired by the President, is constituted by the Vice President, the Director of the Office of Science and Technology Policy, 14 Cabinet Secretaries and 7 Agency Heads with significant science and technology responsibilities, 4 Assistants to the President and so on. The number of member of NSTC is larger (30 persons) than those of S&T council in Korea and Japan, but eminent persons from various academic or industrial worlds don't belong to the member of NSTC. Their opinions are indirectly provided through agency and institute heads.

The NSTC convenes periodically as a rule. The main function of NSTC can be summarized as follows:

1. Coordinate the S&T policy-making process
2. Evaluate S&T policy decisions and programs how much consistent with the President's stated goals
3. Help integrate the president's S&T policy agenda across the Federal Government
4. Check S&T policy are considered in development and implementation of Federal policies

To accomplish the function of NSTC, a number of expert committees, sub-committees, and working/project groups consist of NSTC's organization. Fig. 3 shows the organization of NSTC and main expert committees in NSTC.

The role of committee is similar to committees of NSTC in Korea. Committees are specialized to advise and assist the policy-making and evaluation process in their fields. Also, they support maintaining a strong relationship between CSTP and Federal S&T policies with other cooperated organizations. Committees can be changed or reorganized according to circumstance and S&T policy line of US. In 2014, five committees were operated in order to assist the main function of NSTC. Table III shows the objective and main roles of five committees [5]-[9]. Unlike S&T sub-committees in Korea and Japan, committees are more focused on fundamental science and education.

TABLE III  
FIVE SUB-COMMITTEES OF NSTC

Committee	Objective	Main roles
<b>Committee on Environment, Natural Resources, and Sustainability</b>	To enhance the overall productivity and application of environment and natural resources policy	Creating integrative R&D program related natural resource and environment Supporting S&T for sustainability to promote sustainable system Developing metrics to measure sustainability
<b>Committee on Homeland and National Security</b>	To improve overall effectiveness of policy that provides mechanism to promote S&T related national security science	Addressing reviewing technical issues that affect national security Identifying and recommending priorities in national security R&D
<b>Committee on Science</b>	To increase the overall effectiveness related developing new knowledge in the sciences, mathematics,	Coordinating all science policy-making processes Facilitating NSTC clearance of documents generated by interagency groups
<b>Committee on Science, Technology, Engineering and Mathematics Education</b>	To coordinate Federal programs and activities support of STEM education	Coordinating with budget, STEM education activities and programs based on Federal agencies Developing the participating agencies 5-year STEM education and strategic plan
<b>Committee on Technology</b>	To improve overall effectiveness and productivity of all Federal policy in technology	Facilitating technology planning and communication among Supporting technology programs and initiatives that enhance national and, local competitiveness

### C. Comparison of the Current State of the National Science & Technology Council between Korea, USA, and Japan

Based on the comparison to the current state of the National Science & Technology Council in the USA, and Japan, some implications providing a desirable direction for NSTC in Korea can be derived as follows.

1. Authorities between committees of NSTC should be balanced for the advance of diverse sectors of national science and technology
2. The system of NSTC should be reformed for the industry-academic cooperation on a more active scale
3. Eminent experts who don't belong to the member of NSTC and put forth opinions freely and frankly can be elected

4. Temporary sub-committees and working/project groups can be organized for getting ready to provide expertise information

#### IV. CONCLUSIONS AND FUTURE RESEARCH

The main contribution of this study is to derive implications for the advance of national science and technology based on the comparison analysis of the current state of the National Science & Technology Council between Korea, USA, and Japan.

Despite all major implications of this study, it has several limitations that suggest paths for our future research. First, this study only investigated the system of National Science & Technology Council in USA and Japan. Thus, National Science & Technology Council in other main countries can be investigated thoroughly to derive plentiful implications. Second, the performance of NSTC in Korea should be analyzed to diagnose detailed matters of NSTC. To do this, NSTC's performance based on the policy items on the national R&D agenda can be identified.

#### ACKNOWLEDGMENT

This work was supported by the KISTEP grant.

#### REFERENCES

- [1] M. H. Lee, I.J. Hwang, Determinants of corporate R&D investment: An empirical study comparing Korea's IT industry with its non-IT industry, *ETRI journal*, 25, 2003, pp. 258-265.
- [2] M. Nagano, R&D investment and the government's R&D policies of electronics industries in Korea and Taiwan, *Journal of Asian Economics*, 17, 2006, pp. 653-666.
- [3] L. Stenberg, N. Hiroshi, Priority-setting in Japanese research and innovation policy, *VINNOVA Analysis*, Stockholm, 2009.
- [4] MEXT, *White Paper on Science and Technology*, 2013.
- [5] NSTC, *Charter of the Committee on Environment, Natural Resources, and Sustainability*, 2014
- [6] NSTC, *Charter of the Committee on Homeland and National Security*, 2014.
- [7] NSTC, *Charter of the Committee on Science*, 2014.
- [8] NSTC, *Charter of the Committee on Science, Technology, Engineering and Mathematics Education*, 2014.
- [9] NSTC, *Charter of the Committee on Technology*, 2014.