

Analysis of National Comprehensive Plans of the Ministries for Radiation Technology Policy

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1. Introduction

The socioeconomic impact of science & technology has increased with the advent of the fourth industrial revolution. The role of science & technology in addressing social problems and improving the quality of life has drawn public attention than ever. It is necessary to exert an effort to meet the expectation of society and it applies to radiation technology as well.

Radiation science and technology features technological convergence of radiation technology with various fields such as environmental engineering, materials engineering, biology, agricultural science, medicine, pharmacy, physics, chemistry, machinery, electronics, food technology, etc. The application of radiation technology is related to different social agendas such as environment, industry, public health, food and agriculture, and public safety. Based on the above understanding, with a goal of maximizing the socioeconomic benefits of R&D on radiation technology, this study was planned to investigate national comprehensive plans of the ministries and analyze links with radiation technology. The result is expected to be used in designing needs-based and demand-driven R&D policy.

2. Methodology

This study investigated national comprehensive plans established by the ministries in accordance with relevant statutory provisions. Each national comprehensive plan was then analyzed to review any link with subfields of radiation technology. The analyzed subfields were compared to the technical focus of the national comprehensive plans on radiation technology of the Ministry of Science and ICT (MSIT) and the Nuclear Safety and Security Commission (NSSC).

2.1 Scope

In consideration of the range of the application of radiation technology, 17 central administrative agencies (13 ministries, 3 agencies, 1 commission) were selected out of 52 central administrative agencies (23 ministries, 17 agencies, 2 services, 4 offices, 6 commissions). Then, the national comprehensive plans legally obligated to be established by the above 17 central administrative agencies were investigated.

2.2 Investigation and analysis

The national comprehensive plans and the relevant acts were investigated at the website of the National Law Information Center, the All Public Information in-One (ALIO), and the websites of 17 central administrative agencies. The investigated national comprehensive plans were analyzed to review possible links to the subfields of radiation technology. Literature review and consultations by expert groups were implemented.

3. Result

3.1 National Comprehensive Plans

As of 28 February 2018, it was revealed that 17 central administrative agencies had established 306 national comprehensive plans. The Ministry of Science and ICT (MSIT) and the Ministry of Land, Infrastructure and Technology (MOLIT) had the most of 39 plans, respectively. It was followed by 38 of the Ministry of Trade, Industry and Energy (MOTIE), 35 of the Ministry of Environment (ME), 33 of the Ministry of Health and Welfare (MOHW), and 31 of the Ministry of Oceans and Fisheries (MOF).

Table 1. Current status of national comprehensive plans based on legal obligation (as of 28 Feb 2018)

Ministry	No.	Ministry	No.
Ministry of Labor Employment and Labor(MOEL)	11	Ministry of Unification(MOU)	2
Ministry of Science and ICT(MSIT)	39	Ministry of Oceans and Fisheries(MOF)	31
Ministry of Education(MOE)	14	Ministry of Environment(ME)	35
Ministry of Land, Infrastructure and Transport(MOLIT)	39	Ministry of Food and Drug Safety(MFDS)	4
Ministry of Agriculture, Food and Rural Affairs(MAFRA)	21	Rural Development Administration(RDA)	3
Ministry of Health and Welfare(MOHW)	33	Korea Forest Service (KFS)	19
Ministry of Trade, Industry and Energy(MOTIE)	38	Cultural Heritage Administration(CHA)	3
Ministry of Foreign Affairs(MOFA)	2	Nuclear Safety and Security Commission (NSSC)	4
Ministry of SMEs and Startups(MSS)	8	Total number of plans	306

3.2 Analysis of national comprehensive plans

The Space, Nuclear & Big Science Policy Bureau of MSIT is responsible for promotion of research & application of radiation technology. The NSSC takes a responsibility for overall safety and radiological emergency preparedness. They established 7 national comprehensive plans specifying national policies on radiation technology, as shown in table 2. Therefore, excluding these 7 plans, 299 national comprehensive plans of 16 central administrative agencies were analyzed to review possible links to radiation technology.

Table 2. National comprehensive plans on radiation technology

Ministry	National comprehensive plan
MSIT	Comprehensive plan for promotion of nuclear energy
	Comprehensive plan for promotion of the use of radiation
	Plan for research and development projects on nuclear energy
NSSC	Comprehensive plan for nuclear safety and security
	National radiation disaster prevention plan
	Comprehensive plan for protection from radiation in natural environment
	Plan for research and development projects on nuclear safety and security

The analysis on 299 national comprehensive plans revealed that 49 national comprehensive plans out of 299 were related to the application of radiation medicine technology, as listed in table 3. MSIT has the most, 18 plans, and MOHW has 10, followed by 6 of MOTIE.

Table 3. National comprehensive plans related to radiation technology

Ministry (No. of plan)	National comprehensive plan
MSIT (18)	Master Plans to Support Science Museums
	Master Plans for Science and Technology
	Master Plan for Promotion of Internationalization of Science & Technology, ICT
	Plans for discovering and fostering scientific talents for early discovery and systematic fostering of scientific talents
	Policies for expansion and sophistication of facilities and equipment for research and development
	Master plans to nurture and support scientists and engineers
	Master Plan for International Science and Business Belt
	Master Plans for Developing Professional Engineer System
	Comprehensive Nanotechnology Development Plan
	Master Plans to Facilitate Brain Research
	Master plan for promoting the three-dimensional printing industry
	Basic Plan for Biotechnology Support
	Master plan for the management of biological research resources
	Master plans for fostering and supporting women in science, engineering, and technology
	Comprehensive plan to promote special zones

Ministry (No. of plan)	National comprehensive plan
	Basic Plan for Promotion of Space Development
	Plan for Development of High-Tech Medical Complexes
	Comprehensive plan for the promotion of basic research
MOFA (1)	Basic plans for international development cooperation
MOHW (10)	Master plan for preventing and controlling infectious diseases
	Master plan for fosterage of health and medical service technology
	Plan for the development of health and medical services
	Master Plans for Cancer Control
	Master Plans for Nurturing Pharmaceutical Industry
	Comprehensive Dementia Management Plans
	Comprehensive plan for the development of Korean Medicine and Pharmaceuticals
	Comprehensive Plan to Foster Korean Medicine and Pharmaceuticals
	Comprehensive plan for the development of Korean Medicine and Pharmaceuticals
	Master Plans for the Development of Cosmetics Industry
MOTIE (6)	Plans for innovation of industrial technology
	Master Plans for Radioactive Waste Management
	Master plan for national standards
	Master Plan for Development of Industrial Convergence
	Energy Technology Development Plans
	Basic Plans for Development of Materials and Components
MOEL (2)	Basic plan for development of the national technical qualification system
	Basic plan for the management and operation of qualifications
MOF (1)	Master plan for the development of maritime affairs and fisheries
MOLIT (1)	Plans for National Core Transport Network
ME (4)	Comprehensive plan to preserve the environment at the national level
	Comprehensive Plans to Improve Atmospheric Environment
	Comprehensive master plan for promoting water reuse
	Plans for Promotion of Environmental Technologies and Environmental Industry
MAFRA (2)	Master plan to promote and support the seed industry in agriculture and forestry
	Comprehensive Plans to Promote Science and Technology for Food, Agriculture, and Forestry
RDA (2)	Comprehensive Plan to Promote Agriculture Biotechnology
	Comprehensive Plan for the Research, Development, and Dissemination of Agricultural Science and Technology
KFS (2)	Master plan for the development of testing and inspection on food and drugs
	Master plan to promote safety technology for food, drugs, etc.
Total	49 national comprehensive plans

* The names of national comprehensive plans are quoted from the relevant provision of acts translated and serviced at the National Law Information Center of the Ministry of Government Legislation (MOLEG)

The analysis also revealed the correlating subfields of

radiation technology to 49 national comprehensive plans as described in table 4.

Table 4. Correlating technical fields to national comprehensive plans

Technical fields of radiation technology	No. of plans
Composite/electric materials	4
Biomaterials	9
Membrane materials	5
Water resource management	5
Air pollution control	3
Diagnostic medical equipment	8
Industrial equipment	3
Radiotherapy equipment	9
Radioisotope generator	6
Mutation breeding	5
Radiation protection/effect	9
Plant application/microbial resources	4
Food irradiation	6
RI labeled imaging application	5
Radiation related drug development	15
Radiation molecular diagnosis	8
Brain disease imaging	11
Radiopharmaceuticals	9
Clinical convergence based therapy	4
Industrial development & capacity building	7
Joint research & contribution to global goals	6
Public understanding & human resource development	6

* Technical fields were classified for effective comparison with national comprehensive plans

3.3 Comparative analysis of national comprehensive plans on radiation technology

The Comprehensive Plan for Promotion of the Use of Radiation of the MSIT and the Comprehensive Plan for Nuclear Safety and Security of the NSSC are the main national comprehensive plans specifying the government policies on the promotion and application of radiation technology. These two national comprehensive plans are to be established based on the needs of the society. The above 49 national comprehensive plans of different central administrative agencies reflect the needs and demands of the society in some degree. However, the comparison between the technical focus of two national comprehensive plans and the subfields of table 4 showed difference in some areas such as composite materials, water pollution, food safety, medical equipment, disease oriented clinical application, public understanding, and contribution to UN sustainable development goals. It is required to further develop radiation technology policy in line with other government policies and promote inter-ministerial programs.

4. Conclusion

This study reveals that radiation technology can contribute to the achievement of policy goals of 49 national comprehensive plans of 16 central administrative agencies. However, it is not fully

reflected in national comprehensive plans on radiation technology. Policy makers, public institutes, and researchers should exert more efforts to improve socioeconomic benefits of radiation technology in line with national policies of various central administrative agencies.

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