The Prospects of Korean Science and Technology Policy

Seung Duk, Park
Assistant Minister for Technology Policy
Ministry of Science and Technology
The Republic of Korea

Direction of the main policy

The main policy on which the Government will place emphasis can be described in 4directions:

① Manpower development for R&D

First, development and securing of manpower for high-tech R&D

The securing of creative manpower is a prerequisite to promoting technology innovation and addressing dependence on imported technology. With this view, the Government plans to cultivate and secure 58,000 high calibre scientific manpower, which is 14 persons per 10,000 population, by 1991. By the 2000's, we will secure 150,000, or 30 persons per 10,000 population, th current level of advanced countries. Of special note, among the 150,000, 10%(15,000 persons) will be secured as the leading high-tech brains, who will take charge of national R&D is system engineering, software technology R&D, which are our weak areas and act as a barrier to attaining advanced technology.

To achieve this goal, we will pursue the qualitative improvement in the science and engineering university education. While expanding and strengthening the function of manpower development at the Korea Advanced Institute of Science and Technology(KAIST), the Government plans to cultivate creative and young manpower in science areas by developing special education programs for the gifted students. In addition, science high schools, Korean science and technology colleges and the Korea Advanced Institute of Science and Technology will form an interlinked system for effective scientific and technological education.

While expanding task oriented overseas training for post-doctorate candidates to master the new high-tech areas, we will continue to attract manpower from abroad in

the science of field and technology until such time when our needs are met.

In addition to this, while creating an appropriate R&D atmosphere for high-tech manpower to concentrate on creative nd productive research, we will introduce the necessary incentive system, including support funds for research and the expansion of awards to outstanding researchers.

② The expansion of investment in science technology

Second, the expansion of technology investment and maximization of effectiveness.

The Government has created a suitable atmosphere for technology development in various areas by promoting a technology-advantageous policy. In line with this investment increased drastically from 0.8% of GNP in 1980 to 2.12% of GNP in 1987.

Our investment volume is far below the relative rate of advanced countries, which stand at 3−5% Particularly, in absolute amounts, the investment is less than that of one single enterprise in America or Japan.

Therefore, the Government will expand investment in science and technology to 3% of GNP in 1991 and to over 5% in 2001.

As a measure to accomplish this investment goal, the Government will increase the volume of technology development investment in the public sector as much as possible(2.5% in 1986 and 4−5% by 1991). As for government funded institutes, we will guarantee self-regulatory management and lead the voluntary expansion of investment through strengthened technology and manpower development.

As for the private sector, the government will encourage private aector R&D activities and strengthen their support, including various financial measures, tax deductions, technology information and exemption from military service for R&D personnel, in an effort to create a competitive atmosphere.

③ The promotion of the national R&D plan

Third, The Government will expand the national R&D projects, which have been implemented successfully since 1982, to promote the development of core strategic technology in line with medium and long-term technology development plan.

To cope with the drastic increase in demand for technology development, the volume of R&D in specific areas will be continuously expnded. The Government will establish a national R&D system by uniting the ability of government-funded research institutes, universities and public and private research institutes into the goal-oriented direction.

The Government aims to create a cooperative research system imvolving the private and government sector. In the short term, the Government research will be principally in major industrial and main strategic areas which the private sector cannot pursue alone. In the medium-and long-term the Government will gradually pursue longterm strtegic technology development.

④ The national-wide expansion of technology development

Fourth, to cope with the "localization age", the Government, will promote the expansion of technology development nation wide.

Cultivation & securing of high-tech manpower of international standards

	1988	1989	1990	1991	1986-2001
University gard-uate courses	540	610	615	630	9,780
KAIST courses	150	230	280	275	4,000
Manpower from abroad	200	200	200	200	2,000
Total	890	1,040	1,095	1,105	15,780

International comparison in volume of investment in science & technology

	Unit	Korea (1987)	America (1987)	Japan (1987)	W. Germany (1985)	France
Total investment in science and technology	$100million	26	1,231	499	177	166
Relative comparison Rate	Korea=1	1	47	19	7	6
of GNP	%	2.12	2.77	2.77	2.83	2.32
Government: private	%	28 : 72	49 : 51	49 : 51	40 : 60	54 : 46

By establishing future ariented technology cities emphasizing the characteristics of each areas, and building base cities for "technology development" "manpower development" and "industry development", balanced regional development will be made possible.

· The basic strategy is to link regional and environmental characteristics, with the appropriate selection of regional specific industries in accordance with development potential, making reltive technology mnpower reside in the country, expanding the function of related research according to the demands of regional industry and expansion of market information and technology information.

While the Government pushes ahead with the establishing of Daeduk Science Town and development of science towns by building nearly high-tech industry complexes, various small and medium size research complexes will also be established in other areas in connection with existing industrial complexes, agriculture-industry complexes and local universities.

Therefore, by connecting all regional high-tech complexes systematically, "the national-wide techno-belt" will be established step-by-step.

Research+Education | High-Tech Industy | Culture/Welfre

Science Technology Complex which maximally preserves the regional environment

- site: 27,720,000㎡
  population: 50,00persons
- 50 research and education institutions, research manpower: 20,000 persons
- basic facilites: cultural, welfare, school, and living facilities combined

5techno-belt construction plan

Techno-belt on the western coase
- precise machinery
- new energy
- bio technology

Techno-belt on the southern coast
- marine
- aeronautic
- shipbuilding

Techno-belt on the eastern coast
- fine chemicals
- heavy industry
- new mterials
- resource technology

Techno-belt crossing north and south
- bio-technology
- semi-conductors
- electronics
- communications technology

Techno-belt crossing east and west
- complex high-technology
- medical welfare technology

Statistics of R&D activities in specific areas

Category \ Year	Total (82-85)	Year 82-85	86	87	88	Plan for 1989
- R&D expenditures ($100 million)	4,343	1,314	987	1,039	1,003	1,596
- Government	2,590	873	517	550	650	870
- Private	1,753	441	470	489	353	726
- Performance	3,062	1,043	608	733	678	642
- Participating	1,281	563	240	253	225	189
(medium/small sized companies)	(872)	(342)	(187)	(200)	(143)	(128)
- Researchers	27,650	12,650	4,500	5,000	5,500	6,500

The building sites and methods of construction will be decided later upon the results of the "basic plan of Korean style techno-belt construction".

Conclusion: Divison of roles in tec|hology development and promotion of cooperative research

Thus far, I have talked about the goal of middle and long term technology development and the direction of strategy. For the efficient utilization of the limited science and technology and mximization of efficiency, a rational role division should be made first. Based on this, the cooperative research system can be estblished. As the technology becomes more complicated, complex and large in size, and the connection between science, technology and industry deepens, advanced technological nations pursue cooperative research systems and push for systemization of available resources. therefore, based on a combination of the principles of competition and cooperation the Government will pay attention to the promotion of cooperative research though an appropriate role division.

• Competition is the precondition to promote science and technology innovation. Technology innovation will be active when the spirit of enterprises, seeking maximum profit under free competition, is realized.

• On the other hand, Korea has limited available resources. The principle of cooperation is as important as the principle of competition. Through the pooling of limited R&D resources, we will pursue flexible risk-sharing method to cope with the rapidly changing science and technology.

System of role division

Enterprises
Industry technology development
Rationalization of enterprises

Government-funded research institutes
Concentration on basic-research related to high-tech R&D

National & public research institutes
Performance of support function related to public technology development

Universites
Basic research
Manpower development

As the technology innovation by the principle of competition basically belongs to the market

area, we should remove unnecessary regulations which limit competition.

Considering that universities secure 80% of top class researchers(doctorate degrees). the strategy of the principle of cooperation should be pursued around universities as the central figure. For this,

• First, in order to promote university-based cooperative research for the development of generic scientific and technical knowledge, we should develop research groups among goal-oriented universities.

• Second, the Government should formulate specific research groups at universities and support research expenses, research facilities and information to promote the R&D activities of universities.

• Third, as a system to promote R&D activities among universities, industry and research instituties, the Government should establish basic tasks in high-tech strategic technology areas sffiliated with R&D between enterprises, research instituties and universities, as an R&D consortium.

• On the other hand, the principle of competition and cooperation can be applies efficiently to the exchange and cooperation of science and technology among countries while participating in keen competition based on industrial technology, we will pursue a cooperative R&D plan actively with all nations under the principles of equality and reciprocity.

컴퓨터로 土地의 生態學的 영향 예보

영국의 생태학자들과 사회학자들은 토지사용에서 오는 광대한 변화로 말미암은 생태학적 영향을 예보할 수 있는 "수퍼" 컴퓨터 모델을 개발할 계획이다.

그같은 변화에 대한 지식은 유럽 국가들이 농산물 과잉 생산량의 절감, 생활환경의 질적 향상, 위락의 필요성 변화, 주택, 도로 등의 요구에 직면하게 됨으로써 그 중요성이 증대되고 있다. 농작물과 식물, 동물 등에 대한 이른바 "온실효과" 의 잠재적인 영향도 이 작업에 새로운 긴급성을 부여해 주는 것이다.

최근 영국자연환경 연구원과 경제사회연구원이 발표한, 예산 80만 파운드(9억 1,600만원)의 토지사용 전략 4개년계획에 따라, 사용자가 농업, 산업, 도시, 위락 등 활동의 환경적 영향을 평가할 수 있도록, 광범한 계획에 대해 거의 단추 하나로 즉각적인 대답을 얻을 수 있는 최신 의사 결정 지원시스템(DSS)이 개발될 것이다. 광범위한 토지사용 전략계획은, 연구원들이 토지와 물사용 문제의 모델링 작업에 많은 경험이 있는 뉴잉글랜드 동북부 뉴캐슬대학교와의 협동으로 추진된다.

DSS를 운영하는 과학자들은 지리정보 시스템을 이용하여, 이를테면 토지의 한 지역을 농업용에서 위락용으로 바꾸는데서 오는 생태학적 및 사회경제적 영향에 대한 "실시간" 컬러 그래픽 시뮬레이션(모의 실험)을 작성하여 스크린에 디스플레이 한다.

뉴캐슬대학교에 본부를 둔 연구팀은 타인강과 그레이트 우즈강 등 두 군데의 집수역을 의사결정 지원시스템의 시험장소로 이용할 계획이다.

전략계획에서 마련되고 있는 또 하나의 연구에는, 산림관리 전략의 평가에 관한 작업이 포함되어 있다. 유럽 최대의 인조림인 스코틀랜드와 잉글랜드 접경의 킬더숲이 종합적인 컴퓨터 모델의 대상이 되는데, 이것으로 어쩌면 몇십년이 걸릴 토지사용 정책의 결과를 얻을 수 있을 것이며, 이것은 똑같은 형태의 관리를 받는 다른 지역의 숲에도 응용될 수 있을 것이다.