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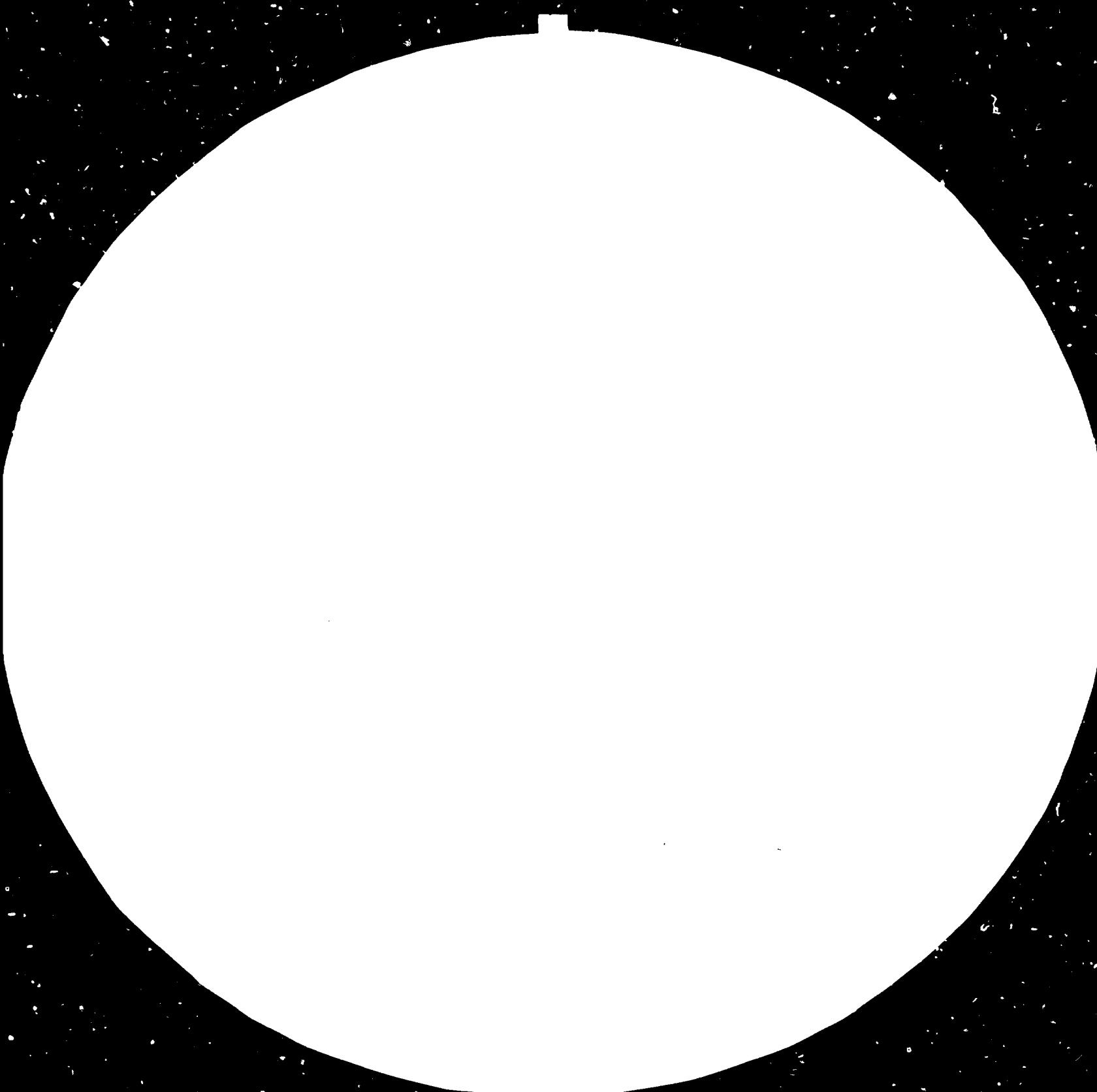

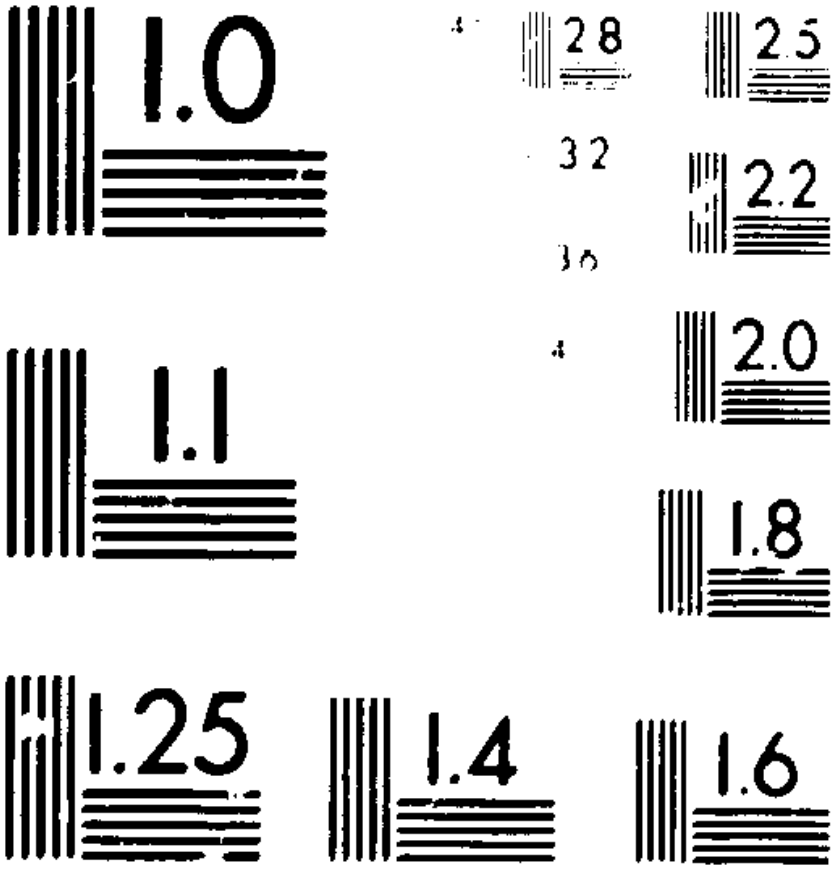

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THE KOREAN INDUSTRIALIZATION EXPERIENCE

with emphasis on the development of scientific and technological capabilities and human resources -

prepared by Mr. Jung-man Suh

Jung Man Suh

This paper was prepared by Mr. Jung Man Suh, Deputy Assistant Minister for Manpower Planning, Ministry of Science and Technology.

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The Korea Industrialization Experience

-with emphasis on the development of scientific & technological capabilities and human resources

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I. INTRODUCTION

1. Socio - Economic Background

The Republic of Korea occupies the southern half of the Korean Peninsula, which extends in a southerly direction from the northeast Asian mainland. It covers on area of 98,955 square kilometers. Only about 23 percent of the land is arable; about 67 percent consists of forested mountain slopes, and the remaining 10 percent consists of urban areas, industrial estates, roads, etc. The R.O.K. is very poorly endowed with mineral resources in terms of both the variety and quantity of its reserves.

Korea has been a unified country for more than 1,300 years. Its language belongs to the Ural-Altai language group. The country lies between China and Japan, yet its isolation as a peninsula has guaranteed the preservation of its own cultural identity.

There are no strong regional or religious cleavages, or entrenched caste structures. The Korean people are free to choose their own religion. There are virtually no traditional obstacles to the mobility and adaptability of labor, nor to economic development in general.

Korean independence, after thirty-six years of Japanese occupation, was attained in 1945, with the Allied victory in the pacific War, but this was almost immediately followed by the Korean War, which brought major devastation to the country. Only with the 1953 truce were the Korean people finally free to enter the modern age of nation-building, not to mention the application of modern science and technology. Koreans brought to this opportunity their own heritage of respect for learning, their cultural adaptability, native ingenuity, and an enterprising spirit conducive to entrepreneurship. This social acceptance has been of great improtance in building a free economy, which depends on private and entrepreneural initiatives more than anything else.

2. Development Overview

The division of the peninsula into two Koreas has resulted in an unbalanced division of natural resources for economic development of both parts. Moreover, the Korean War, which broke out in 1950, demolished nearly all existing production plants, leaving Korea a perfect example of an underdeveloped country. Worsening economic conditions continued, in a vicious cycle, until 1962, when the Five-Year Economic Development Plan was launched.

The First Five-Year Economic Development Plan (1962-66), which was for all practical purposes the first real industrialization effort, began with the development of highly labor-intensive industries, absorbing the abundant labor force from the primary sector. It focused on laying the foundation for future economic growth by building up the infrastructures and concentrating on those basic industries considered to be key industries for future growth. These included energy industries; coal, electric power, and oil refineries, and such others as fertilizer cement, chemicals, and textiles. Because of weak domestic savings power, which together with inadequate social overhead capital(SOC), are the main constraints on rapid industrialization, Korea being no exception, the Government opened the economy vis - a - vis foreign countries to obtain the necessary additional funding, and placed the greatest emphasis on building roads, ports, communications, and other national development essentials, and in particular, expanded educational facilities for technical and vocational training. About 50 percent of the total induced foreign capital was allocated to this SOC area,as well was over 70 percent of the total public funds from overseas.

The Second Five-Year Economic Development Plan (1967-71) forged ahead with the modernization of the industrial structure through a rapid expansion of the steel, electronics, machinery, and petrochemical industries. Efforts were also made to promote the development and expansion of export industries, such as textiles and plywood. What was attempted during the Second Plan period was, in essence, the initiation of a growth momentum through the development of lead sector

industries. These industries, by their very nature, are highly capital-intensive, and also require very large infrastructures, which have to be supported by the Goverment because they are essential to the foundation upon which the high-linkage industries can be built.

The Third Five-Year Economic Plan (1972-76) followed more or less the same direction of industrialization, with further development of heavy and chemical industries to a scale that would facilitate the absorption and adaptation of high-level advanced technologies.

The harmoniation of growth and stability was the basic theme of this Third Plan. It also aimed at regional balance through an innovative development of the rural economy. The "Saemaul" (New Community) Movement was instituted to promote the equitable dsitribution of the wealth accumulated as a result of the tremendous increase in exports and to contribute to further social development.

In the midst of the quantitative expansion of the economy, however, special attention has been paid to such qualitative issues as social and economic equity, and social development was a basic objective throughout the period of the Fourth Economic Development Plan (1977-81).

In addition, the Fourth Plan placed national emphasis on the renovation of the economic structure for self-sustained growth, as well as on technological innovation and improvement, which were keys to the country's continued economic growth.

After a period of successful development during the past two decades, the Korean economy began to decelerate. In 1980, in particular, it underwent the hardship of negative growth. Fortunately, indications of a slow but steady recovery have been visible since late 1980, but the Korean economy as a whole is still feeling the constraints of the recent recession. The causes of the current difficulties do not lie only in extra-economic factors, such as the second oil shock and a bad harvest, but are also related to the fadt that the Korean Goverment failed to properly reorient its economic management strategy to the changing economy

and social environment. This also brought about a number of undesirable consequences in the economy, such as a chronic inflationary spiral due to government-initiated investment activities and intervention in the market mechanism, and inequalities between income classes as well as between regions.

Now at a turning point, the Korean economy must overcome these difficulties, and the Fifth Five - Year Plan for Economic and Social Development (82-86) was prepared from this perspective, with, the objectives and strategies outlined as follows

(a) The highest priority will be given to price stabilization in order to reduce the rate of inflation to within 10 percent.

(B) Efficiency will become the foremost criterion for making investment allocation decisions, and greater efforts will be directed toward augmenting domestic savings, to ensure an economic growth rate of 7 to 8 percent per year.

(c) By promoting competition, the Government will allow the market mechanism to play its proper role.

(d) The export-led growth strategy will be maintained and an open-economy policy will be more actively enforced.

(e) Efforts will be made to develop industries that have a comparative advantage in both the domestic and the world markets.

Ⅱ. SCIENCE & TECH. FOR DEVELOMENT

1. Role and Strategy of Science & Tech.

Science and technology have been an important Korean national planning policy instrument since the early sixties and as a consequences, science and technology plans have been implemented parallel with economic plans. There have beenthree main types of science and technology strateies in support of industrialization.

During the 1960s, the main development goal of industry was to lay a foundation for industrialization through the development of import-substitute industries, the expansion of light industries, and support for the consumer-goods industries. The science and technology strategy was to strengthen scientific and

technical education, to build up technological infrastructures, and to promote foreign technology utilization

In 1967, the Ministry of Science ane Technology a spin-off from the Economic Planning Board,was created,to act as the focal point for planning,promoting,and coordinating the nation's scientific and technological activities. The Science and Technology Promotion Law was enacted in the same year and The Korea Institute of Science and Technology(later to become the Korea Acvanced Institute of Science and Technology,or KAIST), a comprehensive industrial technology research institute, was established in 1966

In the 1970s,the science and technology strategy aimed at strengthening technical and engineering education in the heavy and chemical industry fields,improving the institutional mechanism for adapting imported technology,and promoting research to meet industrial needs. These strategies were to support the Government's efforts to expand the heavy and chemical industries.

In line with these strategies, government-supported specialized research institutes were established in the fields of machinery, ship-building, marine science, electronics, electricity, etc. The Technology Development Promotion Law and the Engincering Services Promotion Law were also enacted. Since the mid-1970s, the industrial structure has expanded remarkably.

This leaves an important task for the country in the 1980s,namely to maintain the growth rate and in perticular to enhance to efficiency, of the manufacturing sector.

In this context. in the present and third stage of our economic development the 1980s, our industrial policy is and will continue to be directed to wards transforming the industrial structure on the basis of the principle of comparative advantages.

Due to the scarcity of investment capital and natural resources, the comparative advantage of Korea exists in technology-intensive industies such as machinery and elctronics.

To this end, in the science and technology fields, we will continuously work towards the training and recruitment of highly-qualified scientists and engineers, the promotion of productivity in R & D, and the localization of key strategic technologies.

2. Policy Directions for Developing Scinece & Tech.

As explained earlier, for a country like Korea, which is poorly endowed with natural resources but has an abundant labor force of relatively high quality, technology is an important element in economic development.

Korea's science and technology policy in the past can best be summarized as a broadening of the infrastructure and the creation of a suitable environment for technological research and development. These efforts have made a tremendous contribution to the high growth rate of our economy, achieved during the last two decades, but we believe that increased productivity through continuous technological innovation is needed to maintain the high rate of economic growth.

The following goals for science and technology development, therefore, were established in the Fifth Development Plan (1982-1986) :

o training and maintaining a high-quality pool of technical manpower

o promoting productivity of R & D

o localizing key strategic technologies

o promoting private research and development, etc.

It is estimated that there will be a shortage of app. 30,000 scientists with M.S. or Ph.D. degrees in 1991, based on current supply capacity. In addition to expanding graduate school education in science and engineering, public sector institutes, such as KAIST, will participate in training highly quqlified technical manpower. The repatriation program for Korean scientists and technicians working abroad will also be actively pursued to increase recruitment and more trainees will be sent to advanced countries for techinical training at government expense. This matter will be discussed at greater length in a subsequent section.

To promote prodictive R & D, government-funded research institutes were

consolidatec in 1981,to integrate research capabilities and to form centers of expertise for technological areas of national importance. Greater efforts will be made to maintain a creative research environment to stimulate research. In pursuance of this policy,institutes will be operated in accordance with the principle of emphasizing the role of researchers by respecting academic autonomy and by stressing their responsibility to society,while fringe benefits will be expanded to boost motivation and morale.

Korean R & D organizations will actively seek opportunities for carrying out joint research with renowned institutions overseas. Moreover, the investment of venture capital in foreign high-technology projects overseas will be promoted, and a comprehensive system of collecting, processing and disseminating technological information will be established in conjunction wiht the Korea Institute of Industrial Economics and Technology, which began operations in 1982. To localize key strategic technologies, national industrial projects with high potential for success in the international marketglace, which cannot be pursued by industry alone, have been and continue to be initiated since last year. The criteria for selecting such projects include knowledge-intensive, considerations as to whether they are resource-conserving and have prospects for export on the basis of a clear competitive edge, such as line chemicals, semi-conductors,computers, and precision machinery. Industry, research institutes and the Government will jointl carry out such strategic research projects by forming centers of expertise in each field. Joint research with developed countries, as well as the inducement of advanced technology, are an integral part of this plan.

In addition to national efforts to develop science and technology, industrial technology development by the private sector will be promoted and encouraged by increasing incentive measures and by support from public sector institutes. A system will be established for industry-led development of industrial technology by inducing each large-scale firm to establish on institute, and small-scale firms to form consortiums. These institutes and R & D consortiums will receive much the same privileges from the Government as the public sector institutes,

including endowment funds to carry out joint national projects, and the same military conscription exemptions for researchers. Government taxation and financing support will also be expanded to promote private technology development. The Korea Technology Development Corp., which was established in 1981,will play the central role in financial support of private technology development.

Ⅱ. MANPOWER DEVELOMENT

1. General

The total population in Korea rose from 26.5 million in 1962 to 38.8 million in 1981. The population density of 385 persons per Km^2 ranks Korea third in the world, in this regard. Population growth maintained the rapid rate of 3 percent per year during the 1960s, but slowed to a more moderate rate of 1.6 percent per year during the 1975-80 period, due mainly to a gradual reduction in family size and is anticipated to go down to 1.55 percent per year during the Fifthe Development Plan Period. The graphic structure of the population has changed from a pyramid to a bell shape.

The size of the total population necessarily brings with it a commensurate increase in the economically active segment of the population from 8.2 million in 1962 to 14.4 million in 1981, at an annual growth rate of 3.2 percent, and is anticipated to rise to 18.9 million in 1991, at an annual growth rate of 2.58 percent.

As has frequently been pointed out, Korea is poor in natural resources, and its accumulation of capital and technology has thus been seriously limited. This means that Korean economic development has been based on and supported by its abundant human resources, whose deucational level has been relatively high and whose potential has been great.

The Korean Government has implemented manpower development planning with special emphasis on training and education in science, engineering and crafts, because with the success of its economic development plans, technology-intensive industries have come to be emphasized, and these require a large number of highly-

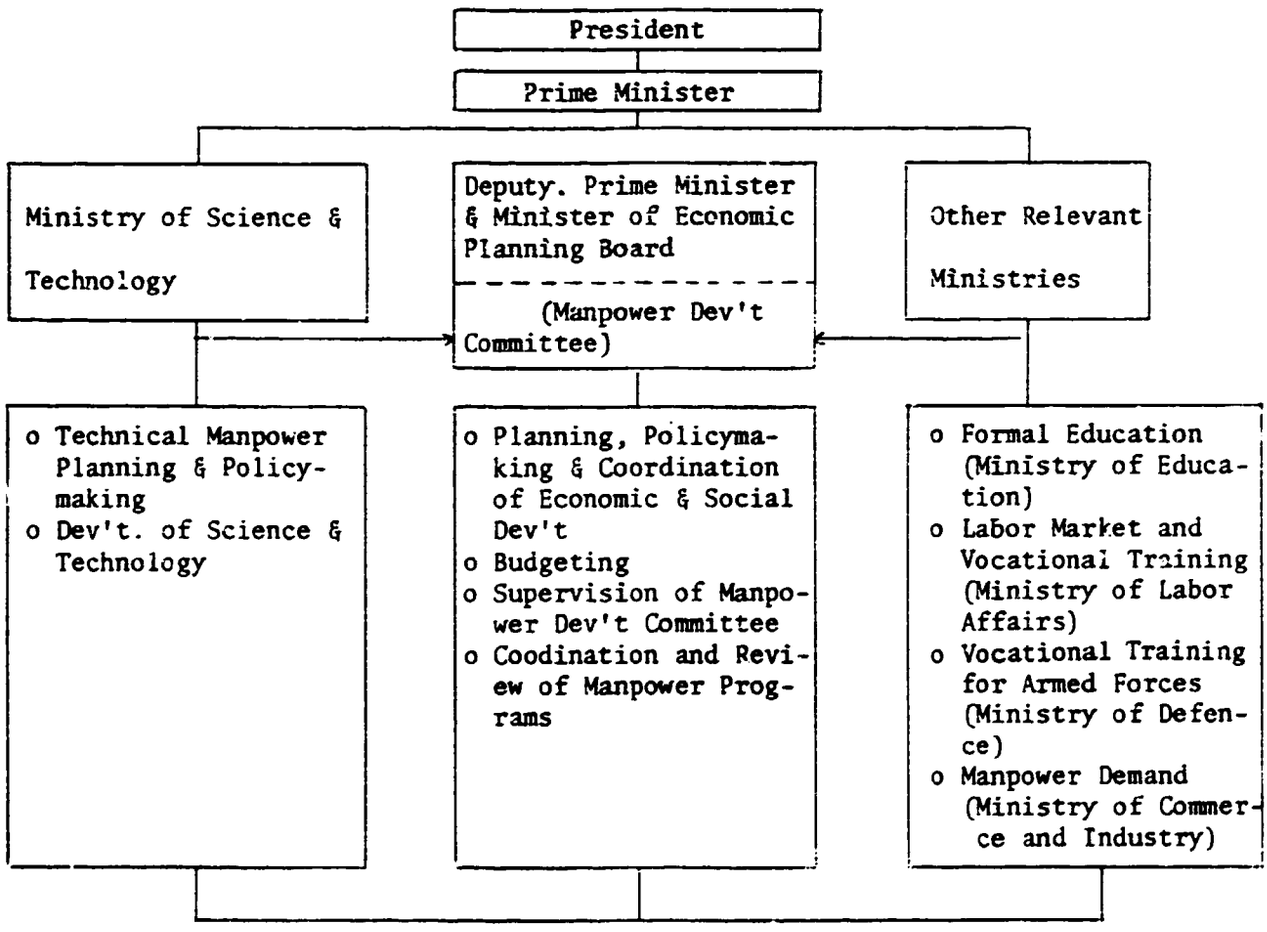
qualified personnel. Another reason is that due to traditional concepts, vocational and natural science education have not been well received by the Korean people, in spite of the increasing social need for industrialization

2. Outline of Manpower Development System

A. Administrative Machinery for Manpower Development

As shown in the chart, the organization reaponsible for over-all coordination and review of manpower programs, ranging from planning to training, is the Manpower Development Committee.

Administrative Machinery for Manpower Development



Coordination and Balance

This Committee, composed of the Deputy Prime Minister(Minister of the Economic Planning Board) as chairman, and sixteen other ministerial-level members, has the following functions:

a) review, coordination and promotion of technical manpower development

b) improvement of technical manpower development system

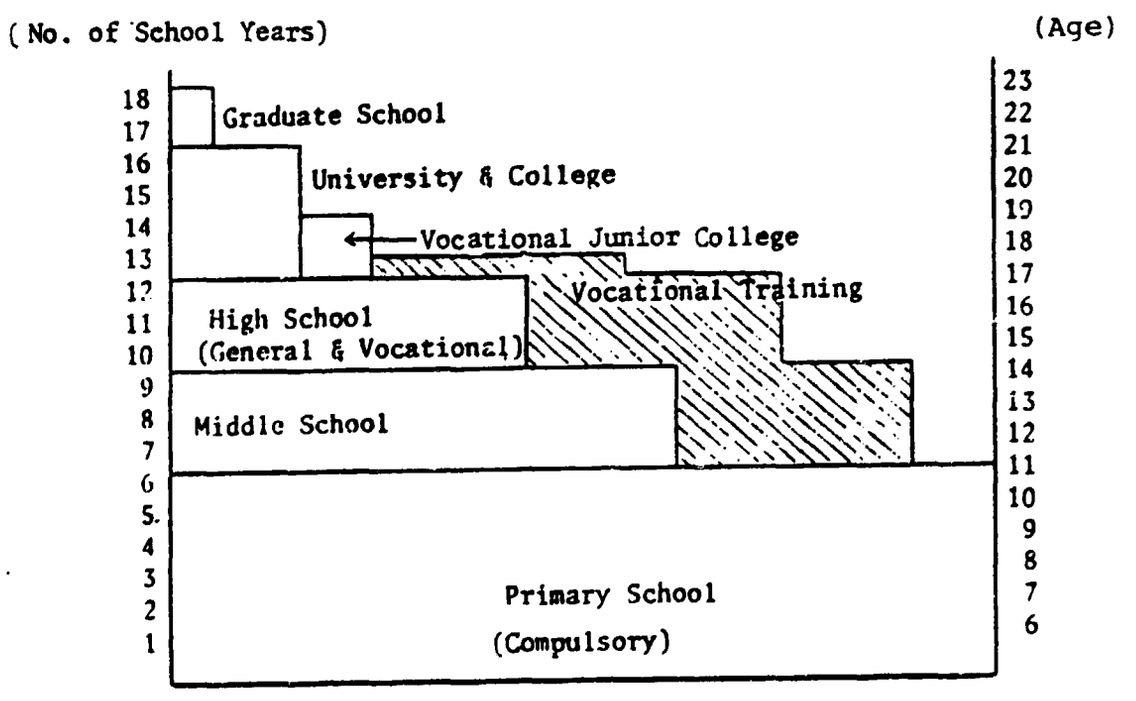
c) coordination and support of overseas employment

d) other matters related to manpower development

The Ministry of Science and Technology is responsible for projections, planning and policy-making for technical manpower development, the key manpower for industrial development, thus providing broad guidelines for technical education development, conducted by the Ministry of Education, vocational training, conducted by the Ministry of Labor Affairs, and other manpower development programs.

B. Formal education

The modern Korean educational system, basically a 6-3-3-4 year structure, was founded in 1948, and has continued with only minor changes. After six years of primary education (compulsory), students are offered three years of junior secondary education (middle school), which includes some pre-vocational elements but is basically of a general type. In senior secondary education (high school), the main choice is among three-year general, technical, agricultural or commercial curricula. After high school graduation, students may continue on to a four-year college course or to a two-year vocational junior college.



Primary Education: Since Primary education became compulsory in 1948, the number of pupils at this level has increased sharply. The enrollment rate for the eligible age group (6 to 11) rose from 95.1% in 1965 to almost 100% in 1982. As of 1982, there were 6,501 schools with 5.5 million pupils and 125,000 teachers.

Educational policies have, therefore, shifted emphasis from quantity to quality, such as reducing the number of pupils per class, thus improving the teacher-student ratio, eliminating classroom shortages, and subsidizing educational expenses completely. The Government also plans to extend compulsory education from the present six years of primary education to nine years, through the middle school level, by 1991

Junior Secondary Education (Middle School)

The elimination of entrance examinations at this level of education in 1969 caused a rapid increase in the number of primary school graduates entering middle schools. As of 1982, the ratio of primary school graduates entering middle school was 98.0%, and it is expected to rise to 98.7% by 1986. There are 2,213 schools, 2,603,000 students, and 60,718 teachers.

Senior Secondary Education (High School):

The goal of high school education is to provide a broader general and vocational education, based on the foundation laid by the middle school.

High school education has also increased rapidly, due to the rising aspirations of the Korean people and the Government's support for education. Of all middle school graduates, 86.9% entered high school in 1982.

The high schools can be divided into two categories: general and vocational The vocational high schools are again divided into technical, agridultural, commercial, and marine and fisheries high schools. There are also comprehensive high schools and art high schools.

The Status of High Schools (1982)

Classification	Number of schools	Number of students	Number of teachers
Total	1,436	1,922,221	59,160
General high schools	810	1,068,849	32,001
Vocational high schools	626	853,372	27,159

In spite of the traditional concept of education in Korea, the importance of technical education in modernizing the nation has recently spurred an upsurge of interest in it, and special efforts have been made to induce a substantial portion of graduating junior high school enter students to vocational high schools through the construction of better facilities, scholarships, and other incentive measures, which serve to enhance the prestige of vocational competency.

Vocational Junior College Education:The legal foundation for system this was laid in 1971, and vocational junior colleges have been encouraged to expand their function of supplying the skill-oriented technicians required by industry,through two-year curricula.

Status of Vocational Junior Colleges

(as of 1982)

Classification	Schools	Enrollment	Teachers
Total	128	211,404	6,392
Engineering & Natural Science		105,854	
Agriculture & Forestry		9,322	
Fisheries & Marine Science		5,478	
Medicine & Pharmacy		23,903	
Other		66,847	

However, they face such problems as the general preference for four-year colleges, and rising difficulties on the part of junior college graduates in compe-

ting for employment with graduates of four-year universities and colleges.

The Ministry of Education is currentl · pushing a vocational college education reform program with the aims of: 1) establishing a closer link between the curricula and the requirements of industry 2) expanding the scope of in-service and overseas training for faculty members 3) securing adequate financial support and closer academic-industrial cooperation 4) initiating shory-term special courses.

College and University Education: College and university education aims at searching for truth and developing the methods for its application to the development and welfare of the nation and society, while educating students to assume leadership roles in society. Colleges and universities offer four of six-year courses of study, the six-year programs including the curricula offered at medical and dentistry colleges.

During the 1960s, higher education showed the greatest quantitative growth, as compared with that of other education levels. As of 1982, there were 97 colleges and universities, with 661,125 students and 20,137 professors. On the other hand, qualitative improvement has been modest . Accordingly, higher education policy is now giving priority to the upgrading of quality through innovation

Under the student quota system, the number of students at each college is established and adjusted by the Government on the basis of manpower development policies.

Since 1981, the government has been promoting a mahor reform of u cy and college education. Efforts are being mounted to: a) upgrade the qualification standards of faculty members through the expansion of opportunities for study abroad, granting of research subsidies, introduction of an exchange professor system among colleges and universities, reinstatement of retired professors, and invitation of foreign scholars, b) create an atmosphere conducive to study by introducing a whole-day teaching system and a graduation quota system, increasing scholarships, and granting superior students special exemptions from military conscription, c) further improve the entrance examination system by introducing a prescreening system for applicants and giving more weight to high school academic credits in entrance

examinations, and d) increase financial support for private universities and colleges,create college education councils, and "generalize" experimental colleges with a view to encouragaing autonomous administration of unsversities and colleges.

Status of University & College

(as of 1982)

Classification	Schools	Enrollment	Professors
Total	97	661,125	20,137
Natural Science		58,105	2,491
Engineering		173,530	3,105
Medicine & Pharmacy		32,473	2,734
Agriculture & Forestry		33,495	991
Marine & Fishery		4,289	134
Linguistics & Literature		75,575	2,689
Humanities & Soical Science		160,542	4,552
Other		123,116	3,441

C. Vocational training

An organized vocational training system was established in 1967 with the promulgation of the Vocational Training Law, and since then it has expanded and improved continuously, under the administration of the Labor Affairs Administration of the Government.

Vocational training program's can be divided into three broad categories public vocational training programs conducted by the Korea Vocational Training & Management Agency, as well as central and local government organization, in-plant vocational training programs by industry and authorized vocational training programs by general juridical bodies. The Korea Vocational Training & Management Agency, with 26 public vocational training institutes was founded as a corporate body in 1982, and seeks to achieve effective vocational training, and to design meaningful technical qualification tests. There are several types of training given in the public vocational

training category of the central and local government agencies in These include vocational traing programs for prisomers under the Ministry of Justice and vocational training programs under the Ministry of Defence, as well as handicraft training centers under local (provincial) governments.

In-plant training has been particularly emphasized in Korea to help employers recognize the importance of training and to make vocational training more effective.

Under the Vocational Training Act, enterprises with more than 300 employees, in the fields of mining,manufacturing, electricity and gas, water supply, transportation, and communications and services, and those construction companies with more than 200 million Korean Won (US$ 3million) in contracts a year, are required to train at least 10% of their total employees, of send them to training institutes. The ratio is flexible within 10%, from year to year and from one field of industry to another. Training standards such as training trades, period, basic curricula, and facilities for in-plant training, are set by the Administrator of Labor Affairs. When enterprises fail to carry out compulsory in-plant training, they must pay compensation to the Government on the basis of the number of people requiring training. This compulsory type of in-plant training was initiated in 1977.

There are also many training programs established and run by different types of juridical bodies, for their own purposes and outside the Vocational Training Act. When they meet the training standards set by the Vocational Training Act. they can be approved and authorized, on a request basis, as approved vocational training programs by the Labor Affairs Asministration. The Government rarely gives direct financial suppory to such programs.

Vocational Training Programs

(as of 1982)

Type	Tng Organs	Nr. of Organs	Nr. of Trainees
TOTAL		382	68,325
Public Vocational Training	Sub-Total	87	31,465
	Korea Vocational Training & Management Agency	26	19,440
	National Government Organizations	48	4,825
	Local Government Organizations	13	7,200
In-Plant Vocational Training	Sub-Total	273	31,865
	Independent In-plant Training Centers	231	20,860
	Joint Training Centers	42	11,000
Authorized Vocational Training	Sub-Total	22	5,000
	Social Welfare Juridical Bodies	7	2,000
	Non Profit Juridical Bodies	15	3,000

3. Manpower Projection and Planning

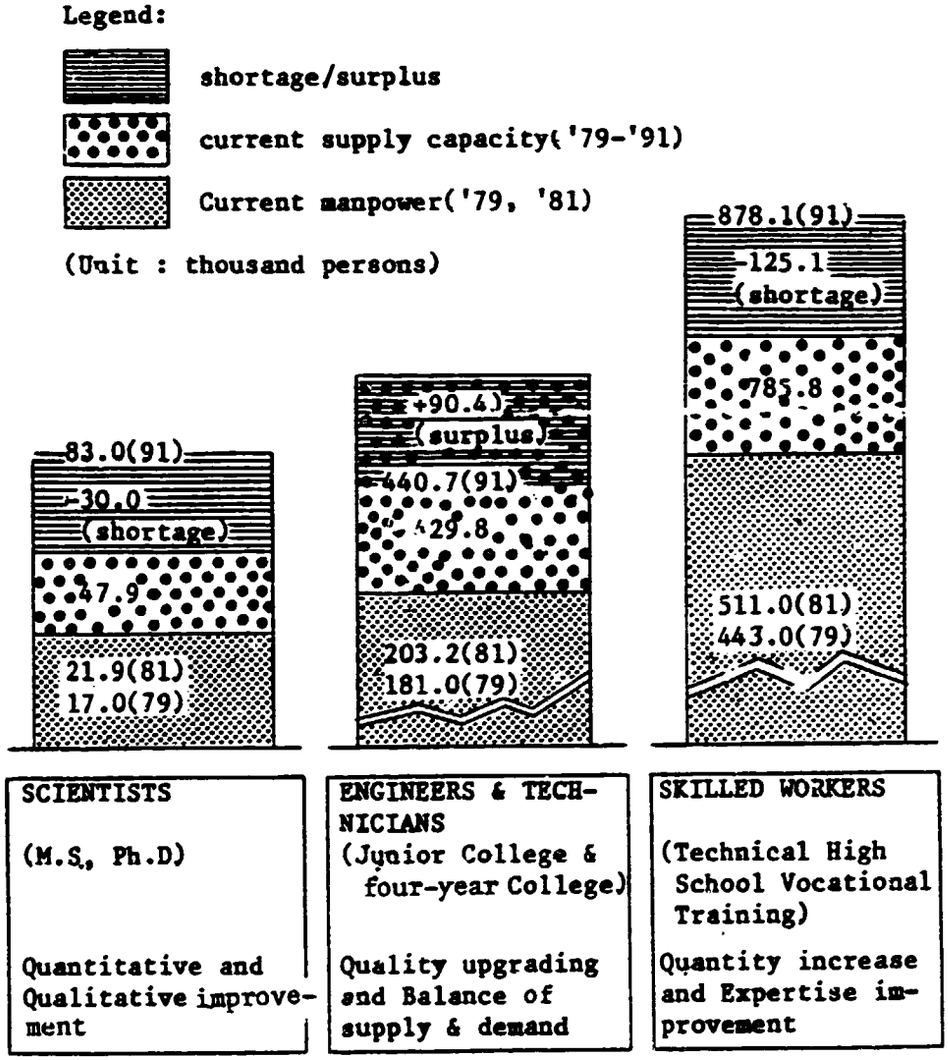
a) Technical Manpower Supply & Demand Projection

The demand for scientists with M.S. or Ph. D. degrees in 1991 is expected to increase to 83,000, from the current 22,000. Based on current supply capacity, there will be a shortage of 30,000 such people by that time. Therefore, we must stress the acquisition and training of highly-qualified manpower.

On the other hand, in 1991 the demand for engineers and technicians trained at junior and four-year colleges will total 440,000, in contrast to the current 203,000, and thus emphasis should be placed on qualitiative improvement and coordination among specialized fields to balance supply and demand. Demand for skilled workers will rise to 880,000 in 1991, from the current 510,000. Thus, there will be a shortage of about 120,999 such people at that time. A quantitative increase in

technical high school and vocational training center graduates will be necessary, while improvement of their skills should also be stressed.

Technical Manpower Projection



b) Development and Acquisition of Highly-qualified Scientists & Engineers

The Korea Advanced Institute of Science and Technology(KAIST) and other government-funded research institutes, will conduct special training programs to develop manpower. With the attainment of their goals, 1,060 doctoral and 2,250 M.S. degree-holders will be available for employment during the Fifth Plan period. By 1991, there should be 2,310 Ph.D. and 4,500 M.S. degree-holders.

(Unit:Person)

	'81	'82-'86	'87-'91
Ph.D.	61	1,060	1,250
M.S.	368	2,250	2,250

To this end, KAIST's doctoral program will be expanded, and joint education programs will be conducted in cooperation with internationally known universities. Discussions are underway with universities of the United States and West Germany on exchanges of faculty, student training programs, and joint research projects.

Other government-funded research institutes will participate actively in manpower development, along with KAIST. Doctoral-level researchers at these institutes will participate as adjunct professors at KAIST, and M.S.-level researchers will be encouraged to relate their research work to their theses.

Researchers at government-funded research institutes will be encouraged to lecture at colleges and to respond to industry's requests for consultation, to promote a cooperative relationship between education and research. On the other hand, college professors and field engineers in industry will be invited to KAIST as guest faculty members.

Secondly, graduate courses at science and engineering colleges will be strengthened, in cooperation with the Ministry of Education

Thirdly, about 759 Korean scientists and engineers working abroad will be invited to return permanently, the plan period, while 1,500 will be invited to return on at temporary basis.

(Unit:person)

	'81	'82-'86	'87-'91
Permanent	45	750	1,250
Temporary	25	1,500	3,750

A systematic survey will be conducted to obtain a comprehensive understanding of the current situation of Korean scientists abroad. Payment commensurate with the

scientists' career levels will be guaranteed. These scientists will be employed jointly by industry, colleges and research institutes.

Fourth, the Government-sponsored overseas technical training program which started in 1981, will be expanded to cover 7,000 trainees, on government scholarships or foreign loans.

(Unit:person)

	'81	'82-'86	'87-'91
Domestic Funds	105	1,800	2,500
Foreign Loans	-	900	1,900

Trainees with specific assignments will be dispatched in each key field. Researchers will study from 3 to 5 years, industrial engineers and technicians, 1 year, and post-doctoral trainees, 1 year. Preliminary training and "post-training" will be carefully managed.

c) Securing Skilled Workers

During the plan period, 1,690 skilled workers will be trained at Industrial Masters' Colleges.

	'82	'86	'82-'86
Number of students	210	440	1,650

To encourage in-plant vocational training programs, exemptions from taxes on training expenses will be recommended.

A precise analysis of occupational work in each qualification field will be conducted before the end of 1983 to reform the National Technical Qualification System to fit practical industrial needs.

IV. INTERNATIONAL TECHNICAL COOPERATION

1. Technical Assistance to Korea

In accordance with its open and outward-oriented policy direction in science and technology development, Korea has sought active international technical cooperation so that it can absorb the advanced technologies of developed countries. Korea received a total of US $288 million in outside technical assistance, from 1951 to 1980

Technical Assistance to Korea (1951-1980)

Financial Source \ Type of Assistance	Training (Person)	Experts (person)	Equipment ($ mil.)	Total ($ mil.)
U N	5,036	1,110	62.0	92.3
A I D	4,050	1,893	64.4	126.3
Colombo Plan	3,735	626	14.5	30.6
Others	4,603	284	17.2	38.5
Total	17,424	3,913	158.1	287.7

There is no doubt that technical cooperation programs have made a valuable contribution to our scientific and technological development during the last two decades. Technical assistance from overseas however, has been decreasing recently, since advanced countries are reluctant to provide advanced industrial technology.

To meet this new technical cooperation situation, the Korean Government has set up new directions. First, technical cooperation with advanced countries will be developed not on a concessional, but on a reciprocal, basis.

Second, we are interested in participating in international cooperative programs initiated by U.N. organizations, in which we can exchange our development ideas and new technologies on a multilateral basis, through increasing contributions in expert services and technical training.

Third, based on the spirit and principles of technical cooperation among deve-

loping countries, the Korean Government wishes to increase its technical assistance to developing areas,and to share its development experiences and technologies for our common prosperity.

2. Korea Technical Assistance to Developing Areas

a. Technical Training for foreign trainees

Korea's first experience with providing technical training for trainees from other developing countries began in 1963 under USAID's third country program. In 1965 the Korean Government started a technical training program for foreign personnel, using its own funds. Two years later, in 1967, the United Nations dispatched one Thai trainee to this country, that being the first instance of a UN fellowship in Korea.

The number of foreign trainees has gradually increased, as Korea has accumulated technical experience through the successful achievement of its Five-Year Economic Development Plangoals

Number of trainees by financial sources

(Unit:Person)

Year / Fund	63-75	76	77	78	79	80	81	82	Total
Korean Government	179	46	55	53	67	155	166	151	873
USAID	1,081	43	20	42	37	21	23	22	1,302
U N	236	14	62	83	78	136	56	149	885
Other	22		20	24	33	22	144	62	308
Total	1,518	103	157	202	215	334	389	384	3,368

b. Expert services

Parallel with the training, Korean expert services were provided to developing areas, mainly in the fields of agriculture and fisheries, and a total ot 109 experts were dispatched for technical guidance and consultancy, from 1967 through 1982.

Number of Korean Experts Dispatched

(Unit : Person)

	Total	67-78	79	80	81	82
Experts	109	57	9	14	11	17

c. Institutional Cooperation

Institutional cooperation among R & D institutes of developing countries is also being promoted by the Korean Government so that they can develop their R & D capabilities through joint R & D activities, and exchanges of technical information and experts. The Korea Advanced Institute of Science and Technology, a leading R & D institute in Korea, has developed cooperation programs with R & D institutes of many developing countries.

V. CONCLUSIONS

For Korea, the past decade has represented an era in which the impact of science and technology on economic growth, national progress, security, and self-sufficiency,has been impressive and profound. During this period, technology has created viable industries established transportation and communications systems, and virtually remade the face of the land. The lives of all the people have been changed From the days of aspiration in the fifties and of rising expectations in the sixties, it is now possible, in spite of external circumstances that burden the nation, for Korea to look forward confidently to another dramatic decade of progress. The foundations have been firmly laid to enable science and technology to lead in this progress. One essential facet of this bold approach was the fact that the country's top policy-makers, as will as legislators, recognized the need for scientific and technological development, and consequently pushed vigorously for such development plans, to the extent of establishing a separate article in the constitution for the development of science and technology as a mandatory duty of the Government in advancing the nation's economy and welfare.

An intensive expansion of human capital formation as a matter of top priority,

before the formation of physical capital, has often been credited with the success of the economic plansin general, and the structures of industries and employment in particular.

The experience gained in Korea leads to the conclusion that the scientivic and technological capacity of development, and as needed, the expansion of high-quality research institutes, is based on development of highly-qualified scientific and technological manpower.

Korea is prepared to share its experience acquired during the course of intensive development efforts over the past decade or so, which has been studded with ups and sowns, positives and negatives. Perhaps they may prove relevant and of some use to other developing countries, at least in preventing them from making the same mistakes.