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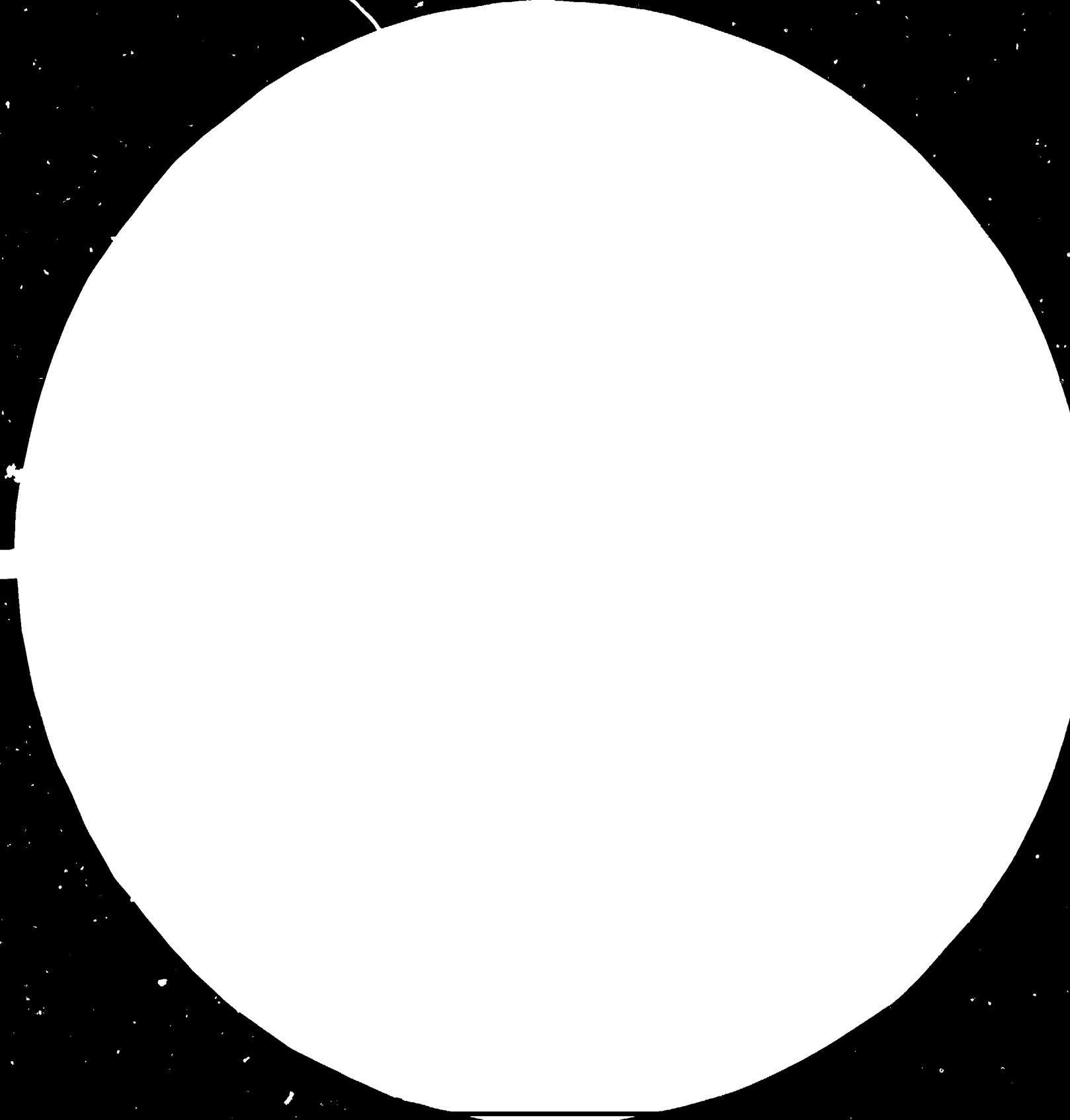
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THE KOREAN EXPERIENCE IN HEAVY INDUSTRY\*

by

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## I. Economic Development

Korea is peninsula with 98,000 km<sup>2</sup> land and 40 million population. Arable land is only 23,000km<sup>2</sup> with little natural resources to speak of. The Korean War (1950-53) completely destroyed whatever industrial facilities existed at that time.

In 1960, output of the manufacturing industry amounted to only 10.8% of the economy; and agriculture, forestry and fishery - 41.3% -- a typical pattern of underdeveloped countries.

The four Five-Year Economic Development Plans (1962-81) paved the foundation for industrialization toward a self-sustaining economy. Mining and Manufacturing industry grew steadily at a rate of 15.8% per year during the Five-Year Plan periods (Table 1).

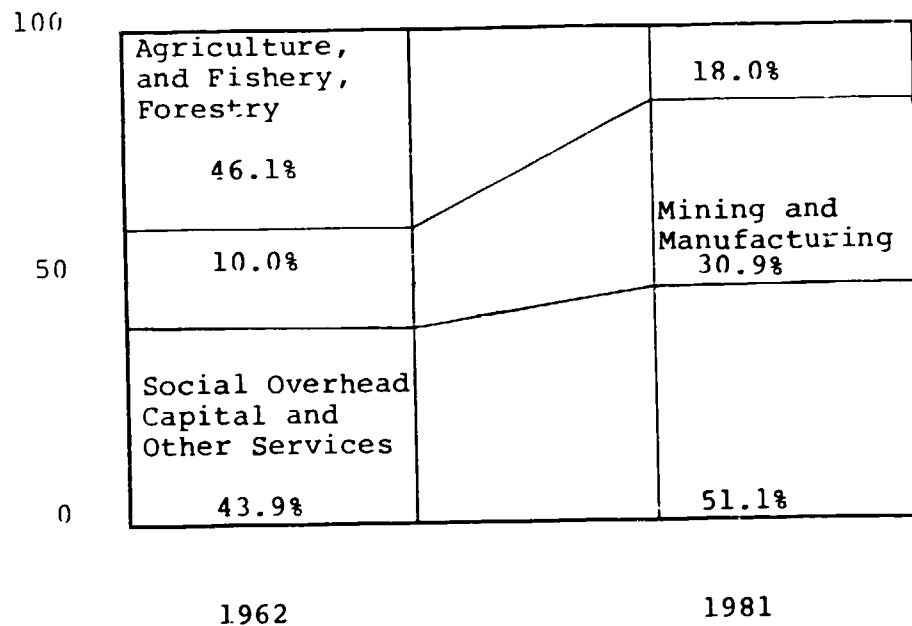
Table 1: Annual Growth Rate of Industry

Annual Growth Rate	1962-66	1967-71	1972-76	1977-81	Ave.
Agriculture, Forestry and Fishery	5.9	1.6	6.2	1.2	2.5
Mining and Manufacturing	14.3	19.9	18.2	9.9	15.8
Social Overhead Capital and Other Services	8.5	12.4	8.5	5.9	8.8

Source: Economic Planning Board

The Five-Year Plans stimulated development of the industrial structures toward a higher level. In 1981; mining and manufacturing sector had a shared level of 30.9% of the entire output and agriculture, forestry and fishery 18.2%. The pattern has shifted toward that of the advanced industrial structure (Figure 1).

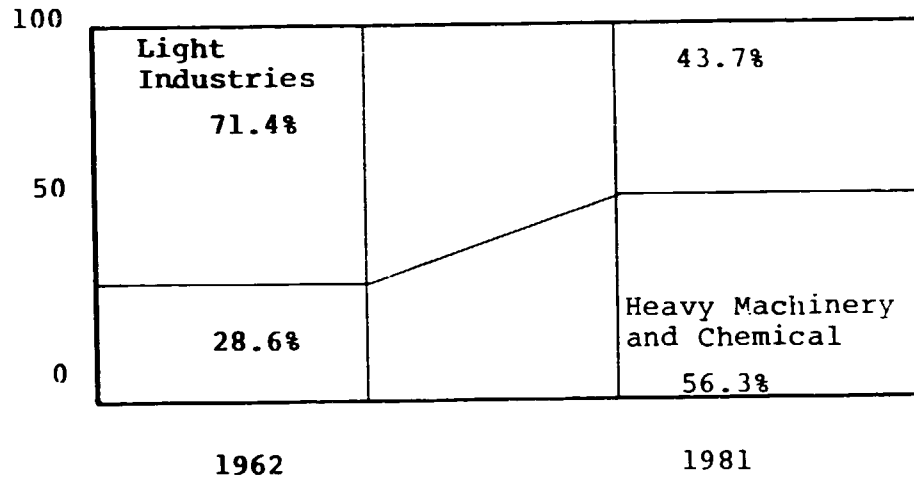
Figure 1: Composition of the Industrial Structure



Source: Economic Planning Board

There has been also significant change within the structure of the manufacturing sectors. The relative portion of machinery and chemical industry against light industry was 28.6% vs. 71.4% in 1962 and changed to 56.3% vs. 43.7% in 1981 (Figure 2).

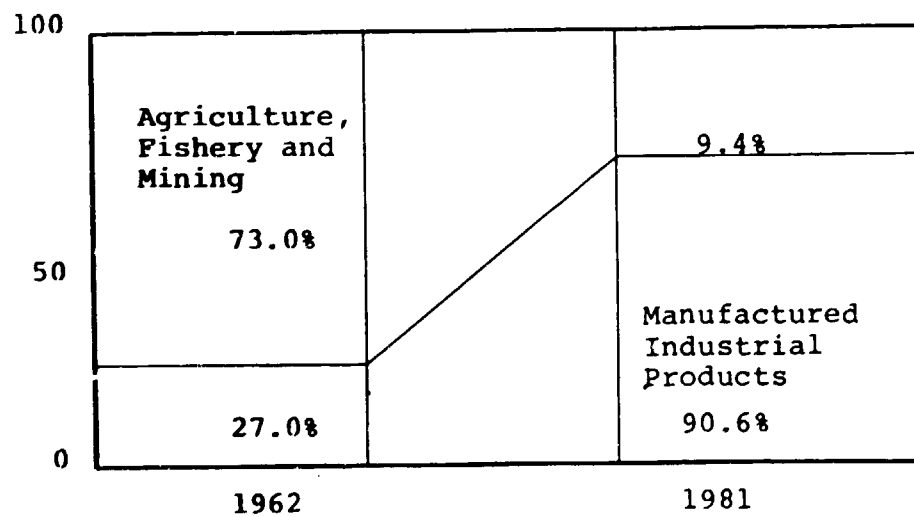
Figure 2: Composition of the Manufacturing Industry



Source: Economic Planning Board

Export commodities have also shown structural changes in their composition. In the early 1960, textile and light industries comprised a major portion of exports. By 1981, shipbuilding, consumer electronics and machinery have taken over the major portion of exports amounting at over 90% (Figure 3).

Figure 3: Composition of Export Products



Source: Ministry of Commerce and Industry



The characteristics of industrialization in these periods are as follows:

1. The first half of the plan period (1962-71) was marked by strong emphasis on consumer product and export-oriented light industries. The period saw a considerable increase in exports of consumer products and effective import substitutions of consumer goods and intermediate products. Leading sectors of the economy were textile, cement, fertilizer and electric power.
2. The target in the second half of the plan period (1972-81) was set at the export of intermediate products, ships, automobiles and electronic equipments. Iron and steel, shipbuilding, automobiles, machineries and consumer electronic products were the main industrial sectors that were especially fostered during this period.

## II. Development in Heavy Industry

### 1. Most Preferred Propositions

After the successful implementation of the first and second Five-Year plans, the development of heavy industry is seen as a means for the economic development to adapt itself to changes in its international and domestic environments, and a move towards a more resilient economy, capable of further growth and maturity. In planning for developing an industry as extensive as the heavy industry, the scale of efforts and the resources that would be required demand a careful analysis of priorities, placed on long-term context. By definition, the concept of "priorities" involves the problem of choice.

From 1969 to 1970, an extensive studies were carried out to cut the problem down to some manageable scope, without sacrificing the essential issues of the national industrialization program. Recommendations were tailored to the state of each particular sector of the industry, within the framework of the overall goals and priorities. A realistic appraisal of the resources necessitated to limit the recommendations to urgent high-priority programs, around which other programs can grow or be built.

It was urgent to spell out the direction of development most favorable to the Korean situation. The methodology selected was to focus planning of development around "building block products" - products in which Korea has a prime advantage and from which the manufacturing capability of the country can be forged. The investigations were carried out to screen the candidate development propositions against a set of explicitly stated criteria until a small number of preferred propositions were identified and then form development plans based on those preferred propositions.

The initial list contained several hundred possibilities. This list was reduced to 34 items which contained substantial labor content as inferred from statistics on value added.

The reduced list of 34 items was analyzed in terms of a decision matrix. The analysis involved a considerable amount of statistical manipulations, engineering considerations of the technical and manufacturing characteristics of the various product categories and consultation with experts on example industries.

The decision matrix for analyzing the candidate list was formed and it consisted of 11 criteria. An explicit measure of performance (not necessarily quantitative) was defined for each criterion. The relative importance of the various criteria was measured and expressed by an iterative process that is a standard operations research technique (Figure 4).

## 2. Building Block Products

The scoring involved the use of statistics and judgment, and the comparison of a product with products previously scored. The objectivity of judgment was assured by the use of the Delphi Method.

Each product proposition was scored according to each criterion, so with 34 propositions and 11 criteria: there are 374 separate scoring entries in the matrix. To get an overall score for a product, the score for each criterion is multiplied by the weight assigned to each criterion, and the eleven are summed. Since the eleven weighing factors add to 10 and the scores for each product and criterion are from 1 to 10, the maximum possible score is 100 and the minimum is 10. These overall scores are shown on the scoring matrix. The scoring matrix is shown on the Table 2 with criteria across the top and product propositions down the side.

In Table 3 are listed product rankings according the three scores: the Overall score based on all eleven criteria; the Industrialization score based on criteria 2,4, and 7; and the Export score based on criteria 1,3,5 and 8.

Table 4 gives the nine most preferred product areas that resulted from the analysis. Although a scoring procedure is involved, the final list is considered to be composed of equally desirable items.

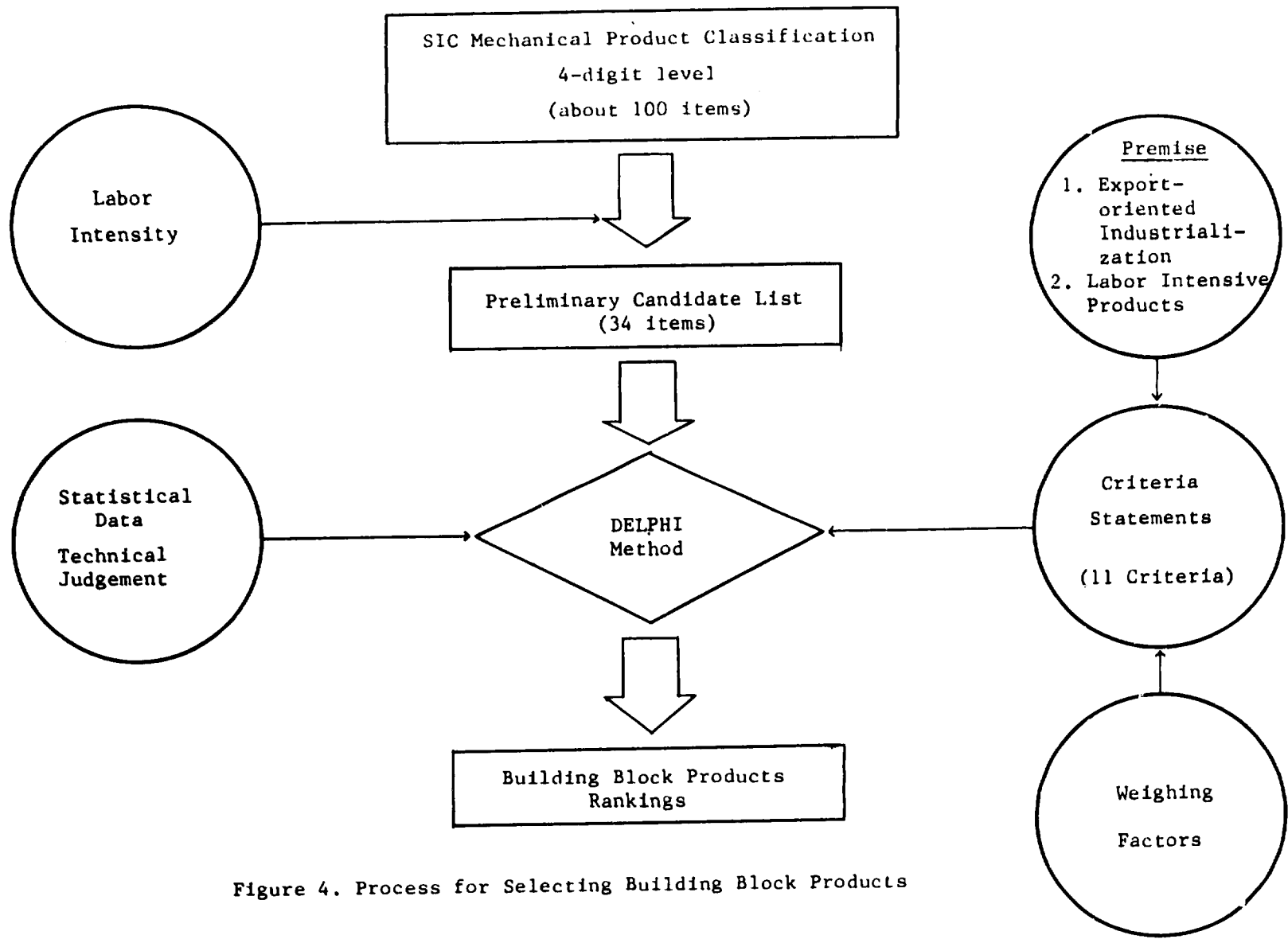


Figure 4. Process for Selecting Building Block Products

Scoring Matrix  
(Product Rating Sheet)

Table 2.

No.	Criteria	1	2	3	4	5	6	7	8	9	10	11
		Cost Advantage	Support- ing Industry	Devel- oped Nations Trade	Korean Value Added	Techno- logical Compati- bility	Domestic Market	Fosters Skills	Develop- ing Nations Market	Develop- ment Time	Used in Many End Items	Part of a Product Mix
Weighing Factor		2.6	1.2	1.2	1.2	1.1	0.8	0.6	0.4	0.4	0.3	0.2
1	Foundry Products	9	4	2	4	9	7	3	3	9	9	2
2	Cutlery, Hand Tools	7	2	7	2	10	5	2	2	9	1	5
3	Heating & Cooling Equipment	4	4	3	2	7	7	3	4	7	1	5
4	Boilers	6	3	1	4	5	8	5	1	8	6	3
5	Fasteners	3	2	3	2	8	6	2	1	8	10	2
6	Springs	5	3	2	1	8	5	3	1	9	7	2
7	Valves & Fittings	5	4	2	5	5	5	4	6	9	8	2
8	Bearings	5	3	1	7	2	6	6	3	8	8	1
9	Internal Combustion Engines	3	6	3	5	2	7	5	7	5	6	5
10	Farm Machinery	3	8	6	5	5	5	6	8	5	1	7
11	Construction Equipment	3	8	4	5	5	9	6	8	5	1	7
12	Crane & Hoist	4	4	5	3	3	3	4	2	7	2	2
13	Machine Tools	7	8	1	7	2	5	8	3	7	1	5
14	Food Machinery	5	5	1	3	3	1	3	1	3	1	3
15	Textile Machinery	7	5	3	4	5	8	5	4	7	1	4
16	Wood Working Machinery	4	4	4	3	4	2	3	1	8	1	5
17	Paper Machinery	6	5	1	3	3	1	3	1	3	1	4

No.	Criteria	1	2	3	4	5	6	7	8	9	10	11
		Cost Advantage	Support- ing Industry	Devel- oped Nations Trade	Korean Value Added	Techno- logical Compati- bility	Domestic Market	Fosters Skills	Develop- ing Nations Market	Develop ment Time	Used In Many End Items	Part of a Product Mix
	2.6	1.2	1.2	1.2	1.1	0.8	0.6	0.4	0.4	0.3	0.2	
18	Printing Machinery	6	5	1	3	3	2	3	1	3	1	4
19	Mineral Crushing Machinery	6	5	2	3	3	2	3	1	3	1	4
20	Pumps and Compressors	4	4	5	4	2	6	5	5	6	4	6
21	Blowers and Fans	5	4	4	6	5	6	5	4	8	4	4
22	Power Transmissions	5	5	1	4	2	6	6	1	6	8	5
23	Office Machines	3	5	5	4	6	4	4	2	8	1	5
24	Electric Motors	6	4	6	3	4	5	4	2	8	9	5
25	Home Appliances	2	4	3	2	7	1	3	1	8	1	5
26	Sewing Machines	7	4	3	3	6	4	5	2	8	1	5
27	Trucks and Buses	7	8	3	5	6	9	6	8	5	1	7
28	Automobiles	1	10	3	10	2	7	10	5	2	1	6
29	Ships	10	9	2	7	5	10	6	9	5	1	1
30	Railway Vehicles	2	8	1	6	2	6	8	2	4	1	4
31	Work/Passenger Vehicles	9	5	3	6	6	5	6	3	6	1	4
32	Mechanical Measuring Equipment	6	2	1	2	4	3	2	1	7	1	1
33	Watches and Clocks	5	3	7	3	7	3	2	2	8	1	1
34	Toys and Sporting Goods	6	2	5	3	7	3	2	2	8	1	1

Table 3. Product Ranking Summary Sheet

Rank	Product Ranking Based on Overall Score	Product Ranking Based on Industrialization Score	Product Ranking Based on Export Score
	Criteria 1-11	Criteria 2,4,7	Criteria 1,3,5,8
1	Ships	Passenger cars	Cutlery
2	Foundry Products	Ships	Ships
3	Small Work/ Passenger Vehicle	Machine Tools	Foundry Products
4	Trucks, Buses	Railcars	Small Work/ Passenger Vehicle
5	Cutlery	Trucks, Buses	Toys and Sporting goods
6	Textile Machinery	Farm Machinery	Watches and Clocks
7	Machine Tools	Construction Machinery	Textile Machinery
8	Construction Machinery	Small Work/ Passenger Vehicle	Industrial Electrical Machinery
9	Farm Machinery	Internal Combustion	Trucks, Buses
10	Blowers, Fans	Bearings	Blowers, Fans
11	Industrial Elec- trical Machinery	Blowers, Fans	Heating and Cooling Equipment
12	Passenger Cars	Power Transmission	Sewing Machines
13	Valves, Pipes and Fittings	Textile Machinery	Farm Machinery
14	Boilers	Office Machinery	Spring
15	Watches and Clocks	Valves, Pipes and Fittings	Valves, Pipes and Fittings



Table 4. Building Block Products

- o Ships
- o Construction Machinery
- o Machine Tools
- o Textile Machinery
- o Farm Machinery
- o Trucks, Buses
- o Passenger Cars
- o Small Work/Passenger Vehicle
- o Industrial Electrical Machinery

Those nine "building block products" were, then, discussed in terms of: detailed identification of the product; examination of the domestic and world markets and the advantages Korea might have in those markets; consideration of the input technologies, intermediate assemblies, etc. needed for the product; and prediction of the industrialization effects that manufacturing the product will have on Korea.

The products were woven into industrial development strategies, indicating the extent of backward integration into component and subassembly production. The strategies for the heavy industry development were concluded by carrying the analysis of high-priority sectors to a more concrete level of industry plans.

### 3. High Priority Sectors

#### A. Shipbuilding Industry

##### (1) Characteristics of the industry

(a) Until early 1970's, the industry's main business in Korea was no more than repairing small ships and building wooden vessels for fishing, owing to the lack of technology and production facilities.

(b) A shipyard for the construction of heavy ships needs enormous facilities and equipment. Also, shipbuilding is time-consuming and expensive, and ties up large amounts of operational capital. Compared with other industries, the rate of capital rotation and profit in shipbuilding is relatively low.

(c) Because of varying conditions imposed by ship owners, design and structural characteristics, shipbuilding is typically labor-intensive; automation is difficult both in designing and building ships. Even in advanced countries, shipbuilding still requires a great amount of labor despite the fact that automation, such as computers, conveyers and automatic welding, has been introduced into the industry. Therefore, shipbuilding is considered a promising industry for a developing country.

(d) Securing work order is a prerequisite for a viable shipbuilding industry. It is almost impossible to estimate production or to mass produce ships since the industry operate on individual order basis.

(e) Since international competition in ship-export is between nations rather than shipyards, the industry's development must have the governmental support.

##### (2) Importance of Developing the Industry

(a) It is a promising export industry. Ships are enormously expensive, and under competitive export situation, they can contribute greatly to the nation's increase of export.

The analysis of the industrial conditions in Korea ranked shipbuilding as one of the most promising export industries as shown in Table 2.

Japan, for example, promoted her shipbuilding industry as one of her basic industries since the end of World War II, and from the latter half of the 1950's she began to dominate the international ship-export market. Since 1960 she constructed about half of the ship tonnage produced in the world, earning billions of dollars.

(b) Its effect in industrialization is very significant. The shipbuilding industry not only promotes the development of satellite industries, but because shipyards have the production capacity for many other heavy structures and plant facilities, it contributes to the industrialization process of the nation in a multitude of ways.

(c) It is indispensable for maritime progress. Ships are the main instrument for the development of ocean transportation, fisheries, and marine resources.

(d) Considering both the geographical condition which favors the growth of Korea as a maritime country and Korea's aspiration of economic development through increased export, rapid progress in the shipbuilding industry was urgently needed. A shipbuilding industry has several characteristics that distinguish the industry from other industries:

Ships employ advanced technology in their design and in the layout of the shipyard where they are built. In the initial shipbuilding stage, primary equipment such as main engines, propellers, deck machinery, navigation equipment and the like were imported, while the building operations were concentrated on the hulls, major structures, and medium-sized machinery items.

The overall domestic content of ships is high, especially using Korean steel, this strong industrialization potential for the shipbuilding strategy along with the good world market

prospects has led to ships scoring as the foremost building block product. In 10 years thereafter, Korea has made significant progress in shipbuilding and ranks now second in the world.

### 3. Automobile Industry

Until 1973 Korea has established only small scale assembly operations for the numerous foreign model cars. Most of the domestic component industries are in depressed state, and were in no position to compete with those in the advanced countries in capital and production. Local manufactured content was up to about 50 percent by value, and serious thought was given to launching a program to boost this to over 90 percent.

#### (1) Characteristics of Automobile Industry

(a) The nature of the role of foreign companies has a key bearing on the development of automobile industries in the developing nations. While the foreign companies typically try to expand the market for their own manufactured items, the developing nations plan and promote progressively higher domestic content.

(b) The automobile industry requires advanced production techniques and capital intensive production methods; labor intensity is therefore low.

(c) The automobile industry needs many supporting industries, and has a strong industrialization effect on the economy. On the other hand, it is also characteristic that automobile production facilities are end-product-oriented in that they serve mostly for the production of automobiles.

(d) Since the market size is a strong controlling factor on auto price, the viability of the industry depends on increasing the demand by reducing manufacturing cost through so to say "mass production".

(e) The rise in the possession of private passenger cars can be directly correlated with the level of national income. Additional factors are the environmental conditions such as roads, highways and service facilities, and the government policies.

(2) Introduction of a Korean Model

(a) An automobile industry requires a broad and basic facilities for mechanical components and subassemblies, particularly for the body, engine and drive line requiring large amount of capital investment. In addition to the obvious needs for large amount of capital, automobile production requires advanced engineering and manufacturing skills from a large number of people.

(b) An automobile is a complex product of thousands of components and the development of the industry depends largely on its component industries. The lack of a viable industry structure of suppliers can be cited as the principal reason for the high cost of vehicle and the resulting small market. The primary emphasis should therefore be placed on the establishment of domestic production of the major parts and components.

(c) Automobile production puts pressures on a nation's economy for all sorts of supporting industries as well as social overheads. As these industries grow they contribute to a higher domestic content and a positive balance of trade, and their output can be used in many industries other than automobile production. A further benefit is that the automobile production technology, quality control principles, management skills, and worker training are transferrable to other industries throughout the economy.

(d) Therefore, despite market limitations on Korean automobiles, they are included in the building block group, because more than any other product they can lead to industrialization. Its long-term development must be also firmly

based on an economical and rational production foundation because of this importance to the national industrialization process.

(e) Considering the industrial conditions in Korea, a study of finding the way to shorten the steps of development process in automobile industry was the key to the development of automobile industry as well as to the industrialization of Korea. A deliberate policy was called for to break the cycle "small assembly production - High price - limitation of sale - investment problem for mass production - small assembly production."

(f) Each country has its own unique characteristics for the development of its automobile industry in accordance with its economic and social conditions. Korea has the rare opportunity in 1973, with the structural changes of the existing auto industry to introduce her own model with the lasting view that reformed the prevailing conditions drastically.

(g) As the result, the Korean Model has induced vigorous investment and promoted long lasting production of parts and components without frequent change in model over many years achieving the effect of accumulative mass production, quality improvement and low price accordingly. The most decisive step in this policy decision was the competitive designation of automobile companies based on their own model design, and adequate and confirmed investment plans.

At present, Korea produces own Model cars in mass, which run criss-cross all over the country and also are exported to Europe, Africa and also American continents.

### C. A complex of Heavy Machinery

(a) In order to supply all the domestic requirements for machinery and equipment and also to build a foundation for an export industry, as a building block a plan for heavy machinery complex was formulated.

(b) Korea has had limited experience in the production of heavy industrial equipment. There were several heavy machinery plants in the country. However, their facilities were obsolete and they lacked experience on modern equipment and methods. Moreover, they by and large operated on custom-order basis rather than on planned production basis. In other words, the plants were not organized to manufacture any specific line of machinery or intermediate products. Consequently, unless a major program of overhaul and modernization of these facilities is undertaken, the manufacture of heavy machinery and equipment in any of the existing plants would not be a feasible proposition.

(c) The immediate objective for planning the complex producing construction equipment and machine tools is in import substitution, manufacturing potential offered by a well-equipped integrated facility and offering high quality components and intermediate products. The proposed complex produces (a) construction machinery and machine tools as end items, (b) such intermediate products as hydraulic devices and industrial equipment for the domestic market and for export and (c) such basic products as castings and forgings.

(d) To manufacture high quality machinery products, the industrial technology of developed countries are to transplant into this sector of industry. The complex serves as technology dissemination center through inducement of foreign subsidiaries or joint ventures in related product areas.

(e) In the developed countries, castings, heavy welded products and custom-made components are costly items. The availability of these products from the complex under attractive conditions provide potential investors with an important additional inducement other than cheap labor.

(f) The manufacturing potential in the complex is multi-dimensional and serves as an important driving force for developing the nation's machinery industry. The complex has also the capabilities and facilities for constructing heavy ship machinery (e.g. engines, auxiliary equipment and deck



machinery) and the production of most capital equipment falling in the heavy machinery category.

Consequently, the fundamental objective for building the heavy machinery complex is to establish a sound under-structure for the nation's mechanical industry, with emphasis on future export as well as on strengthening the nation's industrial capabilities. This idea of a complex was later realized in a different form, namely a regional complex containing many separate plants such as Changwon Machinery Industry Base.

### III. Technology Transfer

The basic approach to selecting products for emphasis in the Korean heavy industry was to judge the products using an elaborate set of criteria. They are meant to cover all the factors which were thought to be important to the Korean situation.

However, certain factors such as "technology transfer" might have been used as criteria. During evaluation process it would have caused complete rejection of some of the promising products if they came out negatively according to the scoring. So the positive approach was taken, and these considerations were accepted as assumptions.

#### 1. Positive Assumptions.

- (1) "Technology transfer" from foreign countries are available.
- (2) Necessary raw materials and parts can be obtained at costs comparable to those in developed nations.
- (3) Necessary product quality can be achieved.
- (4) Productivity of labor will be comparable to that in developed nations.
- (5) Acceptable profitability will be attained, or the operation will be subsidized.

"Technology transfer" is an important assumption that is regarded as a key factor in the heavy industry development, particularly, of the developing countries. Technology is yet, an "acquirable commodity" in the world trade.

The majority of the attempts as yet to transfer technology from a nation to another in which technology is still in the developing stages have centered upon knowhow technology rather than planning technology.

The ultimate purpose of technology transfer, therefore, lies in the improved results that can be expected from the

application of the technology in the production activities.

## 2. Elements of Technology

(a) The fruits of production activities result not merely from technology transfer alone, but are achieved through a combination of all the elements that are applied in production:

### Elements of technology:

- Product technology,
- Process technology
- Production technology
- Maintenance technology
- Skills
- Management technology

(b) In order to have efficient technology transfer, in the heavy industry much more attention must be paid to resolving the incompatibilities between the technology to be transferred and the other elements of the production systems:

### Elements of production systems:

- Machinery and Equipment
- Raw material
- Operators
- Utilities
- Products

(c) In the case of technology transfer between private enterprises, more important factors exerting a direct and significant influence on its efficient realization are the company's motivation and capabilities:

### Elements of business activities:

- Company policy
- Business aspects
- Capital investment
- Procurement
- Employee training
- Maintenance

Production activities  
Management  
Sales

(d) Another important factor determining the efficiency of technology transfer is the various environmental conditions relating directly to technology transfer - government policy and technological infrastructure which includes the educational system, training facilities and scholarly societies in the country:

Environmental elements:

Government policy  
Technology policy  
Industrial development policy  
Economic situation  
Utilities  
Raw materials and industrial items  
Education and training  
Technological infrastructures  
Market: domestic and abroad

Those elements lead us to the conclusion that, if the related factors surrounding the technology have not been built up to a level appropriate to the application of the technology, the effort in technology transfer and development will find itself facing the serious difficulties.

Major policy for the development of Korean heavy industry that can be identified as a success is that sufficient compatibility between the technology being transferred and the environmental conditions surrounding this transfer insured a successful transfer process.

### 3. Major Policies

(a) Acquisition of capital machinery and facilities necessary for technology transfer. Especially in heavy industry, many cases of incompatibility arises first of all from a lack of capital resources for obtaining the necessary machinery and equipment or from a reluctance on the part of the enterprises to make investment decisions to purchase machines and facilities.

One of the successful measures that was taken in this respect in Korea was to secure investment aid to enterprises by moving to liberalize imports of modern production machinery, preferential application of foreign currency and to provide subsidies and incentives including tax deductions.

Of course, extremely careful and strategic consideration must be given to the matter of which industries and which types of equipment should be given priority. The important task in this matter is that the most capable enterprises are chosen in regard to investment and business capabilities.

(b) Difficulties in supply of the materials and other industrial items. The heavy industry in advanced nations is characterized by a close link between the end-products industry concerned with final fabrication and assembly, and the supplier industry that manufactures an almost infinite variety of components and subassemblies.

The final fabrication and assembly may typically account for only 20-30% of a product value, with 70-80% going to the supplier industry. The underdeveloped state of the supplier industry in the developing nations is possibly the single most critical problem in their industrialization process. There is no choice, thus, but to import the necessary industrial products from overseas. Hence, a great effort hoped for from the government is the promotion of materials and supplier industries. This is an item always under heavy promotion by many governments as a part of their economic development plans.

(c) Incompatibility with markets.

Of primary importance in this category, before a consideration of actions that are to be taken by the government is the performance by the enterprises. The fundamental role in this assessment lies a thorough effort on the part of enterprises importing the technologies to achieve an explicit utilization in local and international markets. From a long-term point of view, it is of course important for the government to work constantly to improve local and world market conditions and infrastructures.

(d) Compatibility with human capabilities

Tasks requiring long-term efforts by the government is raising the level of education in science and engineering fields, and the establishment and expansion of various research institutions and technological training centers.

Whether or not the process of technology transfer is carried out efficiently depends largely on the capabilities and motivation of the receiver.

One of the other frequent cause of incompatibility in heavy industry is the fact that the management and engineers of both the technology supplying and receiving enterprises are not sufficiently aware of the implications of the national priority.

#### IV. Conclusion

In addition to the various production and environmental conditions, one extra element was required for truly accelerating the process of technology transfer and the development of heavy industry in Korea.

During the infancy and growth period of the heavy industry, the various conditions surrounding the industry were by no means ideal. Particularly in 1970, when the foundation for development of heavy industry was being laid down, Korea has to achieve her goals under various environmental handicaps - shortages of information, insufficient level of technology, a fragile foreign currency position, difficulties in receiving advice from advanced countries and so forth, especially for those heavy industry projects.

One of the significant driving force in overcoming these initial difficulties was the selfless devotion of the scientists and engineers in the planning group with strong conviction to develop their country and their superb capabilities to realize the ideals.

It has been a historical fact that a large number of Korean students went abroad for better education. The attempt to bring back these Korean-born scientists and engineers who were resided abroad have become very successful. This quickly raised the level of "brain resources" available for the developmental activities.

The successful strategy for the development of heavy industry in Korea is that great efforts are given by the various leaderships not only to the production technology that fits the given environmental conditions, but also to those advanced technology which awakens the latent capabilities of the people for reformation of the environmental conditions to the level required for the technological success.

So far we have discussed a model which was successful in Korea. It is a unique situation which lead to such result.

The structure of economy, level of potential manpower and the national determination are the main factors in choosing the heavy-industry based strategy. Our experience can not be directly applied without consideration of the differences in these factors.

We are here to share experiences to find the most appropriate way for each of our developing countries. In this respect we are very grateful to UNIDO and Malaysian Government who provided such an excellent opportunity to be together and exchange our ideals.



