

# **INTERNATIONAL FACILITY PLANNING: THEORY AND PRACTICE**

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## **I. SUMMARY AND CONCLUSIONS**

Academic studies in industrial location can be broadly categorized into three groups; theoretic studies, empirical studies, and case studies. Theoretic studies derive an optimal state of location from hypothetical conditions with a deductive approach. Empirical studies explain the patterns of location from the statistical data of the real world with an inductive approach. Case studies range from extensive data collection and analyses to intuitive discussions of location patterns. They can be further classified according to the scopes of the studies; location factor, industry, or area.

The review of location theories and practices shows a need for bridging the gap between the academia and the real world in the area of policy formulation for economic development. Current practices of the public policy in developing countries on industrial plant location show that decision

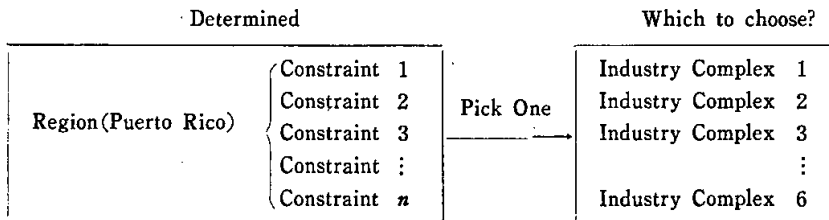
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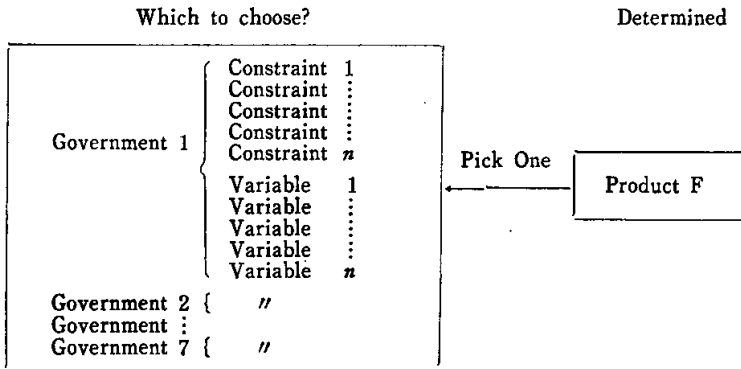
variables such as region or industry which most researchers assume to change according to the changes of the corresponding locational factors are already determined in most cases. In other words, the issue to a policy maker of a developing country (Korea, for example) is not the problem of which region or industry to choose, but the problem of how to formulate policies for a given region (Korea) in order to develop a certain kind of industries (the steel and its related industries, for example), as illustrated in the bottom of Figure 1 which shows an interesting contrast to the two preceding frameworks explored by Isard and Pomper. The description of how

<Fig. 1> Comparison of the Thesis Framework

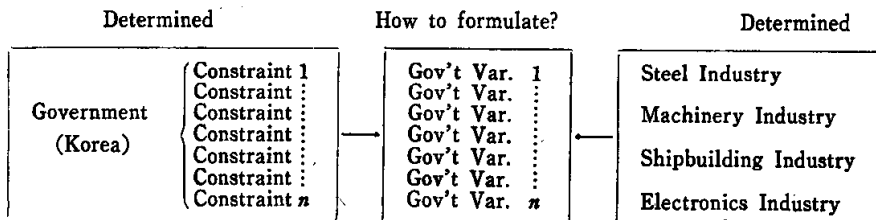
Isard's Model



Pomper's Model



My Model



I would like to proceed this issue is presented in another paper of mine, "Public Policy and Industrial Plant Location."

## II. THEORETIC STUDIES—DEDUCTIVE APPROACH

The classical theory of industrial location is based on the minimization of transport costs as the single most important determinant, while other factors such as labor and external economies such as agglomeration effects are treated to cause deviations from the equilibrium condition of minimum transport costs.<sup>(1)</sup>

The concept of minimum transport costs was originally developed by Johann Heinrich von Thünen who analyzed the spatial configuration where land surface was postulated to be homogeneous in all respects except distance from a consuming center, or 'isolated city state'.<sup>(2)</sup> His formulations revolves on the cost of transportation which explains how the rent of land is determined and why a particular agricultural product is grown on a given plot of land. The theory which he derives from the minimum transport costs and the assumptions of land, capital and labor factors is essentially an explanation of agricultural locations. However, his theory can also be converted into an analysis of the site selection of manufacturing plants. Further, it suggests the direction of policy making in industrial location from the point of a local government.

Alfred Weber (42) applied mathematical techniques to find an optimal point of plant location from a geographic triangle model which represented multiple markets with different volumes of materials to be transported. The

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(1) For a comprehensive review of the classical theory, see Lösch (22) pp. 5~67, Hoover (10) pp. 34~111, Isard (15) pp. 24~54, and Greenhut (7) pp. 3~102. Probably the best reference would be Lösch, while Greenhut treats the subject most extensively.

(2) For reference, see Greenhut (7) pp. 5~8, which explains the treatise of von Thünen, *Der Isolierte Staat in Beziehung auf Landwirtschaft und Nationalökonomie* (3rd. ed.; Berlin: Schumacher-Zarchlin, 1875).

ratio of the weight of used localized materials to the weight of final products was termed 'Material Index'. Then he made the following conclusions regarding the decision with respect to location between the place of consumption and the material deposits. "First,...all industries whose material index is not greater than one lie at the place of consumption (i.e., market oriented). ...Second,...weight-losing materials, on the other hand, may pull production to their deposits. For this to happen, however, it is necessary that the material index ... be greater than one ... (i.e., material resource oriented).<sup>(3)</sup> Weber realized that transportation cost alone is not decisive. He relaxed the special von Thünen assumptions of equal real wages and productivity everywhere, and concluded that labor factor exerts a locational pull. "Indeed, this force may be the dominant one and cause the movement of the industry from the point of least transfer cost to sites of greater transportation whenever the savings in labor cost are larger than the additional transportation cost."<sup>(4)</sup> Consequently, Weber divided industry into two main categories: those oriented to transportation and those oriented to labor. A third but less prominent type of orientation comprises the industries which locate because of the third important factor, agglomerating advantages: proximity to auxiliary industries, better marketing outlets, or economies of size including adequate public facilities.

The vital point in Weber's breakdown of locational factors is his exclusion of institutional and special factors. He treated interest, insurance, taxes, and other similar forces as institutional factors, and excluded them from his general and pure theory of location.<sup>(5)</sup> He also failed to appreciate the full significance of route layout, junctions, and long-haul economies. Hoover

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(3) Heskett (8) in page 375 diagrammatized the locational characteristics with different volumes of localized pure material, localized weight-losing material and ubiquities. The figure visually explains Weber's theory of how plant location is influenced with different volumes of the materials used in making the product.

(4) Greenhut (7) p. 10.

(5) Ibid. p. 11.

(11)<sup>(6)</sup> mentioned this error and presented the analysis of the locational influence of routes and different transport media. Isard(14) generalized Weber's triangle model by substituting rent as an example of production inputs for transport cost and derived the equilibrium conditions for an optimal location for a single producer as well as for multiple producers. Nevertheless, Weber's theory provided later researchers with a point of departure for more advanced studies on industrial location from industry's point of view.

In the mean time, use of mathematical techniques in location theories has flourished. Moses (24), for example, attempted to integrate the input-output analysis with the transportation algorithm of linear programming. This technique allowed him substitution between production processes with different technologies in different regions, which leads to the determination of the optimal location and shipment patterns. Pomper (29) broadened the scope of industrial plant locations on the global basis and applied the dynamic programming in order to identify the optimal strategies in terms of plant location, size of the plant, and sourcing pattern from a company's point of view which produces and markets a petrochemical product among others. Pomper identified seven countries as potential candidates for plant location and markets for the product, and for each of these countries collected two sets of parameters. One represents the conditions of the countries such as market price, size of local consumption, and investment and operating cost; the other represents the governmental attitudes or strategies toward industry such as as income taxes, export incentives, and tariffs. Using these information as constraints to the problem, a huge computer programming was developed to find the optimal strategy which may bring the maximum profit to the company.<sup>(7)</sup> The framework of his thesis is illustrated in Figure

(6) See Hoover (11) p. 27. An example of the case is presented in Hoover (10) pp. 27~30.

(7) See Pomper (29) p. 291 for the list of these parameters. Also, see Stobaugh (37) which explains Pomper's thesis from the perspective of international technology transfer and from the governmental point of view on how to maximize her contribution.

### III. EMPIRICAL STUDIES—INDUCTIVE APPROACH

Recently, many researchers directed empirical studies in order to explain statistically the patterns of location and their implications on policy formulation. To measure the deviations of actual locational decisions of a given region from a normal pattern, such measures as location quotient, labor quotient, and coefficient of localization have been devised.<sup>(8)</sup> Changes in location patterns have been studied through shift analysis. This approach, developed by Zelinsky (43), again takes the nation as the norm in determining the relative growth or decline of a region.

However, there are at least two basic weaknesses in these techniques.<sup>(9)</sup> First, use of national averages as norms suggest false implications that the national industrial structure is optimal and that it is also optimal for any region to have the same industrial structure as the nation. Thus, the potential for misinterpretation of these coefficients is very high.<sup>(10)</sup> Second, the values of these coefficients are dependent upon the choice of regional boundaries being investigated, especially when these boundaries cannot be clearly and objectively defined.

From the international context, the first weakness is critical, if the second one is not. Also, the decision process of industrial location is more complicated due to external variables such as government regulations, cultural difference, and foreign exchange problems. Thus, only the studies with a limited scope such as a specific area or industry are found in the literature.<sup>(11)</sup>

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(8) See Isard (17) pp. 9~12.

(9) See Stevens (34) p. 8.

(10) This point is well taken care of by Isard (16).

(11) Moxon (25) surveyed the general trends of offshore production, i.e., production in foreign sourcing plants, in the less developed countries using the case of the electronics industry.

#### IV. CASE STUDIES—LOCATION FACTOR APPROACH

Besides the studies on generalization of industrial location decisions, numerous case studies have been made focusing on a specific set of location factors, an industry, or a region.

As the size of economic activities increased, and as the specialization and high cost were required for constructing industrial facilities, location decisions became more footloose.<sup>(12)</sup> The emphasis of the studies has also shifted from transport costs to more complex issues such as energy, water, environment, raw materials, taxes and incentives, and labor.<sup>(13)</sup>

Especially labor concern was one of the subjects most frequently studied in industrial location. Segal(44), for example, considered the influence of wages, unionization, skill, and productivity as major determinants in industrial growth in a particular region. He compared the mobility of workers with different levels of skills and concluded that wages and productivity differentials were decreasing in high-skill occupations where mobility was the greatest.

Governmental policy was another major concern in the recent literature. Several researchers agreed that taxes as deterrents and tax concessions as inducements were considered not to be quite effective unless the tax policy was carried to extremes or combined with other locational attractions.<sup>(14)</sup> On

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Another example is by Chang(3), who tested the trends of foreign production in the semiconductor industry. The electronics industry seems to be most extensively used in the studies of international location patterns. Probably it is because the electronics industry is a typical example of labor oriented industry rather than transportation oriented industry according to Weber's definition.

(12) See Neuhoff (27) p. 3.

(13) See Leone (20) p. 51 for "Location Factors Identified by Annual Chemical Week."

(14) Taylor (41) surveyed the cases in industrial tax-exemption in Puerto Rico, concluding that tax-exemption was considered by the investors as the most important factor. Nevertheless, the existence of other locational characteristics such as labor incentives, local market and transport cost insensitivity was found to be the prerequisites to attraction of the industries to Puerto Rico. Chang (3) found the similar trends from the observation of offshore production in the semiconductor industry.

the other hand, direct subsidies, and especially in the form of long-term loan financing were discussed to be effective in recruiting industries.<sup>(15)</sup>

Other locational factors such as water,<sup>(15)</sup> urban vs. suburban location,<sup>(16)</sup> and personal considerations<sup>(17)</sup> were also discussed as major locational determinants.

## V. CASE STUDIES—INDUSTRY APPROACH

This group of studies deals with the specific industries and the factors which influence location patterns. Among the industry studies, steel industry has been repeatedly studied. It may be partly because of its strategic importance in the overall economy, and partly because steel industry represents a transport oriented industry, i.e., labor and other immobile resources have been considered incidental compared with its heavy commitment to the transport costs, thus providing the best example of the classical location theory.<sup>(18)</sup> Stocking (39) and Machlup (23) discussed the basing point price system and concluded that the price differentials due to the geographical distance of the market from the steel industry enhanced the stability of location patterns. Doerr (6) argued the importance of vertical integration of successive processes in the steel industry which reduces the pull of the market, while Isard (13) concluded differently that the efficiency of raw material inputs due to technological innovation increased the pull of the market.

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(15) See Leone (20). He used statistical analysis which reveals the positive relations between plant expansions in the water intensive industries and the access to water transportation. He also stated, "the plant site selection decision is but one decision among many fundamental logistics decisions made by the firm and that, in turn, logistics decisions are only a part of a broader set of corporate marketing and profit making strategies."

(16) See Hoover and Vernon (12). They concluded that suburban areas can benefit from many of the agglomeration economies generated by their central cities while enjoying lower taxes and labor costs and better and cheaper sites.

(17) Greenhut (7) Chapter XII emphasizes the importance of 'purely personal considerations' which refer to the psychic income gains that arises at certain location.

(18) For reference, see Isard (13) pp. 203~17.



The electronics industry was also studied repeatedly. In this labor oriented industry, labor cost and the defense movement were primary reasons for the electronics manufacturers especially in the U.S. and Japan to go offshore production.<sup>(19)</sup> From the case study of multinational electronics industry, Moxon (25) concluded that price competition as an important determinant of offshore production, which confirmed the results of other studies that have shown that foreign direct investment tends to be a reaction to competitive pressure.<sup>(20)</sup> Moxon also found that labor costs and skill requirements were important determinants while shipping cost was not so in electronics industry. His argument reinforces Weber's theory reviewed in Chapter II of this paper.

These industry studies may bring a definitive conclusion that each industry differs in the importance of locational variables, and this variation characterizes relative advantages or disadvantages of a particular region in attracting a particular industry.

## VI. CASE STUDIES—AREA APPROACH

Area studies emphasize the viewpoint of a particular region with its industrial structure and locational advantages, rather than concentrating on a specific industry.

One of these studies was made on the New York Metropolitan Region. Hoover and Vernon (12) made a detailed discussion of the trends in the intraregional location of industry in New York area, and concluded that transportation, site, labor, and agglomeration factors influenced industry in general, and that special transportation means, communication and pollution

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(19) See Moxon (25) pp. 25~26.

(20) His finding supports Stobaugh's conclusion (38) that many foreign investments are defensive in nature, and that the executives who practice foreign investment decisions seem to be insensitive to cost calculations alone unless a strong stimulus is provided. For the detailed discussion of this point, see Aharoni (1) who derived this conclusion from the empirical studies.

influenced specific industries.

Isard (17) made a rigorous analysis on Puerto Rican industry using industrial-complex approach. After comparing six sets of industrial complexes which were made of various combinations of petroleum refinery, petrochemical, synthetic fiber and fertilizer, he concluded that Puerto Rico's large supply of moderately skilled, cheap labor more than compensated for transportation cost disadvantages if agglomeration economies could be established through vertically integrated production. The framework of his thesis is illustrated in Figure 1 for the purpose of comparison with the others.

## VII. CURRENT PRACTICES

Poor regional economic and social conditions often exist within any underdeveloped country and sometimes within economically thriving country. In order to improve these undesirable conditions in their region, policy makers often seek to recruit industries from outside. In the practice of pursuing this objective, however, each government differs in her approach.

The local government of an underdeveloped region in a developed country identifies comparative advantages among the locational variables, then puts her efforts to develop the industries which are most sensitive to these locationally advantageous variables. In most cases, the central government will coordinate these activities and provide the local government with the institutional and special assistance. The theoretical reference of this approach may be found from Ricardian 'theory of comparative production cost'. The case in the eastern region of Canada is an excellent example. The Provincial governments of Nova Scotia and Newfoundland utilized the locational advantages of their regions such as proximity to the U.S. market and excellent port facilities which are icefree yearround, and successfully recruited many of their desired industries including oil refinery

and petrochemical industries to their regions.<sup>(21)</sup> The Federal Government of Canada provided them with the necessary assistance by signing 'General Development Agreement' in which it wrote as their strategy:<sup>(22)</sup>

- (a) identification of development opportunities and assistance in their realization through co-ordinated application of relevant federal and provincial policies and programs, including the provision of specialized measures required for such realization; and
- (b) analysis and review of the economic and social circumstances of Newfoundland and Newfoundland's relationship to the regional and national economy, as these may be relevant to achieving the objectives stated in section 3.

In order to provide specific assistances, the Federal Government created the Department of Regional Economic Expansion in 1968, the primary goal of which was "to assist in equilibrating interregional inequities in economic activity in Canada."<sup>(23)</sup> To achieve this goal, the Department has employed several instruments including Regional Development Incentive Act Grants and Loans to assist industry to locate in slow-growth regions, Agricultural and Rural Development Act Grants and Loans, Fund for Rural Economic Development, and Grants to provinces and municipalities for infrastructure development. Presently, the Provincial governments in Nova Scotia and Newfoundland are in the process of feasibility study for developing steel and its related industries using abundant electricity and raw material resources available in their regions.

On the other hand, the government of a developing country reverses the sequence of the process of developing industries. First, the government

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(21) It is reported in a case study published by the Harvard Business School, Shaheen Natural Resources Company, Inc. (A) and (B).

(22) Regional Economic Expansion, *General Development Agreement* (Ottawa: Information Canada, 1974), pp. 4~5.

(23) Department of Regional Economic Expansion, "Positions with Program Evaluation Division Department of Regional Economic Expansion," unpublished paper.

identifies the industries which may bring the effects of import substitution or stimulation for other industries. Sometimes, macroeconomic techniques are applied to identify the best set of industries. More realistically, however, a simple logic or conviction of the public officials dominate the decision process of selecting industries. The general tendency that many underdeveloped countries support and subsidize national airline industry in spite of its obvious diseconomy reveals the anxiety of these policymakers to keep prestige of their countries internationally.<sup>(24)</sup> The industries which are chosen in this first stage may be commonly called 'the strategic industries'. In the second stage, the government evaluates the locational characteristics of her region against these selected strategic industries. If the government faces a difficulty in attracting the industries because of some disadvantageous locational variables, the government offers incentive programs to the industries to compensate for these disadvantages. These incentive programs are called 'the strategies by the government' in the above mentioned paper, "Public Policy and Industrial Plant Location." Also, disadvantageous locational variables are referred as 'problems and constraints' in the same paper. Constraints are different from problems because the former does not change while the latter can be converted to the strategies according to the flexibility and ability of the government to handle the problems. In reality, however, they may be hard to distinguish.

This sequence of the decision process by the national government of a developing country may sometimes be reversed or take a loop for more comprehensive program evaluation. Nevertheless, the main argument here is that they will emphasize the first stage decisions and try to maintain

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(24) Probably the case of Korean Airline (KAL) would be exceptional to this generalization. KAL is 100% privately owned and has enjoyed the fastest growth rate in the airline industry during 1971~74. Presently KAL is the dominant carrier among those whose main base of operation is Pacific. One of the attributes to their success is relatively cheap labor of excellent skills for pilots and maintenance crew the training of which is provided at no cost by Korean Air Force.

these decisions for their own economic development and industrialization, as they realize the possible economic cannibalization by already industrialized, capitalistic, and imperialistic countries. This trend confirms the 'theory of protection of infantile industries' which was originally advocated by List in the period of German industrialization in the late nineteenth century.

A good example of this case can be found in Korea. Among the locational characteristics of Korea are large supply of moderately skilled and cheap labor, scarce material resources, no oil reserve, shortage of electricity, geographic proximity to Japan, political relations with the U.S., and the strong desire of the government for rapid economic development. Since 1964, more than thirty multinational companies from the U.S., Japan and Europe have built their plants in Korea to manufacture (more accurately, to assemble) electronic components and products. Electronics industry which is characterized as the labor and semi-technology intensive industry may have been an ideal industry to Korea indeed. In response to the initiation of electronics industry to locate the plants in Korea, the government provided the participants with some institutional, taxational and financial stimuli.<sup>(25)</sup> Nevertheless, the major attraction of the multinational companies to have their plants in Korea was to utilize low cost labor Korea to remain competitive in their own domestic market, rather than the governmental incentive programs.

The government of Korea, however, was more interested in the basic type of industries. Among those, steel industry was the one which the government had long desired to develop in order to realize the effect of import substitution, and further to stimulate other related heavy industries such as shipbuilding, machinery, automobile and electronics industries. The potentials of steel industry in Korea did not look promising from the point of view of locational variables. First of all, iron ore reserves in the

(25) For the details, see Presidential Secretariat, *Past and Present of Korean Economy* (Seoul: The Government of Korea, 1975) pp. 81~85.

country were estimated at approximately 112 million tons, of which only 16 percent was high grade ore. Most iron ore reserves contained much titanium and other ingredients, elimination of which required highly sophisticated techniques. The country also lacked bituminous coal and cooking facilities. Demand for steel in 1969 was only 1.2 million tons which was far too small for the economy of scale in steel production. Insufficient electricity prohibited the use of a certain type of technologically advanced processes. As stated in one of the governmental publications, "Considering all these conditions, the (steel) industry does not well suit Korea."<sup>(26)</sup> In the late 1960s, the iron and steel sector was experiencing numerous obstacles such as inadequate facilities, imbalance among existing facilities, low level of technology and high production costs chiefly owing to the small scale of production.

In 1969, World Bank conducted the feasibility study of iron and steel production in Korea, and reported the international consortium which was composed of bankers and steel corporations in the U.S. and Germany and headed by U.S. Steel Corporation that it was too premature and too risky to construct an economically feasible plant complex in Korea which obviously does not possess any significantly advantageous locational variables in favor of steel industry. Consequently, the consortium rejected the plan of constructing steel plant complex proposed by the Korean government.<sup>(27)</sup>

In spite of the report and the failure to acquire necessary loans and other assistance, the government was still determined to realize the plan of steel plant complex. Finally in 1970, the government could receive technical assistance and commercial loan from Japanese industry-bankerstrust under the payment guarantee by Korean government. With a total fund of \$300 million, Pohang Integrated Steel Complex (The First Integrated Steel Complex) was constructed. The capacity of the plant totalled 950 thousand

(26) *Korea: Past and Present* (Seoul: Kwangmyong Publishing Co., 1972) p. 202.

(27) Presidential Secretariat, *Past and Present of Korean Economy* (Seoul: The Government of Korea, 1975) p. 59.

tons of pig iron, 1,032 thousand tons of steel ingot and 950 thousand tons of rolled steel which nearly doubled the total production of steel in Korea in 1973. In the same year, \$60 million or 20% of the total original investment was realized as the net earning.<sup>(28)</sup>

The blunt pursuit of the government of Korea for construction of the steel industry was successful despite all the locational disadvantages and hesitation of the bankers and the steel industry in the U.S. and Germany. Specifically, the success of Pohang Integrated Steel Complex might be attributed to the following reasons:

First, the favorable financial arrangement by Korea government. Among \$300 million of the total investment, \$150 million which was spent for the infrastructure such as port construction and site development was subsidized by the government. The remaining \$150 million of the capitalization cost was provided by two sources; \$85 million was appropriated from the Indemnity Fund from Japan,<sup>(29)</sup> and only \$65 million was raised by the commercial loan from Japan at a low 5.5% interest. Consequently, the plant was responsible for mere 1.2% of the actual capital cost.<sup>(30)</sup> Governmental guarantee for the payment of primary and interest was another factor to attract the Japanese loan attached to the highly advanced steel making technology.

Second, dependence on Japanese steel industry for transporting raw materials and for marketing finished products. This factor enabled Pohang Complex to utilize bulk carriers of up to 40,000 ton capacity, thus compensating the relative diseconomy of scale of its plant size. In the future, however, it may bring vulnerability to the Korean steel industry as the Japanese

(28) Ibid., p. 59.

(29) Japanese government agreed to pay \$600 million of indemnity as a compensation of the spoliation during the period of 1910~45 when Korea was colonized by Imperial Japan.

(30) The figure 1.2% is derived from  $5.5\% \times 65\text{million} / 300\text{million}$ . The fact that only \$65 million was actually capitalized gave Pohang Complex tremendous advantage considering the industry average of \$400 per ton. For the detailed discussion, see Skinner (32) p. 12.

industry sees the competition in a tightening steel market.

Third, quality of skilled labor. For example, the ratio of the investment cost for training a typical skilled laborer, welder, was 9:3:1 among Germany, Japan and Korea. At the same time, the ratio of their wage scale was 10:5:1. In terms of the quality of labor, Koreans were spiritually well equipped and eager to develop their economies in order to defend and compete successfully with North Korean Communists who are constantly threatening their freedom and even existence. One recent article described Koreans as "perhaps the fiercest, toughest, most independent people on the face of the earth."<sup>(31)</sup> Koreans are the frequent winners of gold medals in the Olympics for Skilled Technicians. although steel industry is not a typical example of labor intensive industry, this high quality of labor with cheap wage must undoubtedly have contributed to the success of Pohang Steel Complex.

Fourth, construction of Pohang Complex stimulated other industries as well, most notably shipbuilding industry. In 1974, the total capacity of shipbuilding reached 1.1 million tons (G/T), with the maximum ship size of 350,000 tons (G/T). This forward integration secured the market for the Complex which alleviated the vulnerability of its marketing channel in the condition of fluctuating international steel price.

On the other hand, the hesitation and eventual withdrawal from the plan of constructing Pohang Integrated Steel Complex by the steel industry and the banking group in the U.S., -- especially by U.S. Steel Corporation -- might be due to the following reasons:

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(31) Boston Sunday Globe, *Parade* (June 26, 1975), p. 25, col. 3. Also, see *TIME* (June 30, 1975), p. 40, which reads, "Today Korea seems ready for a genuine industrial takeoff. Mountains of West Virginia coal are piled up at Pohang on the southeast coast where 10,000 employees are producing steel or building plants for what will be the world's largest integrated steelworks. Farther south at Ulsan, the rocky coastline is broken by the giant hulls of 230,000-ton supertankers taking shape at ultramodern yards. South Korea's G.N.P., \$ 17.2 billion, is about the same as Greece's, and per capita G.N.P. for its 33.5 million citizens is \$ 513, ....."



First, they were considering the locational characteristics more importantly than anything else. As mentioned before, lack of raw materials, insufficient electricity, high transportation cost, and small local demand were all disadvantageous to constructing a steel plant. They also considered the political situations in Korean Peninsula not too secure to commit heavy investment.

Second, in early 70's, the steel makers in the U.S. enjoyed high demand for steel. Therefore, the attitudes of the top executives were risk-averse at that time, and they did not consider international expansion of facilities as an attractive alternative. Nevertheless, they could have developed a defensive movement against the invasion of Japanese steel industry into the U.S. market by producing steel products in a region close to Japan and by counterattacking in the Japanese market.

Third, U.S. Steel did not have enough capital to invest abroad. Financing through the sale of equity was too difficult for steel industry in the U.S. (32) Also, price-cost squeeze in the 60's brought the Corporation with low retained earnings and high debt ratios. In order for them to expand their facilities, they had to rely on the investment bankers extensively. The bankers were, however, too conservative to take such a risky venture. Consequently, the investment decision in Korea by the consortium was, as we reviewed, negative. This point shows us an interesting contrast against the later affirmative decision by the Japanese steel industry which was closely tied with a subsidiary of a gigantic banking group. The Japanese industry-banking group not only acted more aggressively than their U.S. counterpart, but also provided its beneficiaries with better and more convenient terms.

Observing the success of Pohang Integrated Steel Complex, the original consortium composed of the U.S. and German investors including U.S. Steel

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(32) See Skinner (32), pp. 27~23.

Corporation again showed an interest in the joint venture with the Korean Government to construct another steel complex.

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