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Industrial Restructuring and the Role of the Asian NIEs in the Asian Pacific Rim Area

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I. INTRODUCTION

During the post-war period until the 1980s, interaction was low between Asian countries in the Pacific rim area due to political barriers and the differences in social and economic systems. However, recently there have been considerable cross-border economic cooperation and development in industrial spaces in the Asian Pacific rim area(APRA). Asian NIEs(Hong Kong, Singapore, South Korea, and Taiwan) have been the major players among those in the area in enhancing external trade and direct foreign investment. The recent increase in trade volumes and investment by the Asian NIEs can be attributed to the changes in international politics and their competitiveness in global competition.

Scalapino(1992, 22-25) summarizes the changes in today's international politics in three ways: First, advanced industrialized societies try to achieve rapid economic growth or ensure steady growth irrespective of political systems; second, there is a general movement toward greater political openness in connection with priority given to economics; third, inter- and intra-country relationships are dynamic and therefore international politics becomes complex. These changes are evident in the APRA today. In other words, the increase in foreign investment and trade by the Asian NIEs can be explained by their emphasis on economic development, movement toward political and economic openness, and establishment of cooperative relationship within the area. For example, the open-door policy of

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China and the new diplomatic relations with Korea precipitated the increase in trade volumes between China and Korea and direct investment from Korea into China during the last couple years (Korea Institute of Industrial Economics and Trade, 1991; Kim, et al., 1992).

The increase in direct overseas investments by the Asian NIEs in the APRA is also resulted from the process of industrial restructuring[1] of the Asian NIEs. After three decades of rapid industrial growth, the Asian NIEs are currently undergoing industrial restructuring. Since the late 1980s, competitive advantages based on low cost labor for the Asian NIEs have been eroded due to the changes in domestic and international environments. These changes include rapid increase in wages, labor shortages in production, price and exchange rate fluctuations, increasing competition in export markets, and protectionist tendency in major world markets.

The Asian NIEs are now facing new problems and challenges in global competition. The rivalry between United States and Japan and the development of regional trading blocs deter the entry of the Asian NIEs into major world markets. The rise of low-cost economies of China and the ASEAN-four(Thailand, Malaysia, Indonesia and Philippines) made the Asian NIEs more vulnerable. How to respond to these problems is the immediate issue for their own survival. Industrial restructuring and economic cooperation within the APRA are believed to be the mechanism to face these challenges in international politics and economics for the Asian NIEs.

Against this backdrop, this paper aims at: 1)examining industrial restructuring and firm strategies on location and technology; and 2)discussing the role of the Asian NIEs in the APRA. A review on the changes in industrial structure of the Asian NIEs follows below. Then, we examine firm strategies on location and technology in the process of industrial restructuring in the case of South Korea. Finally, we discuss the role of the Asian NIEs in the APRA.

II. INDUSTRIAL STRUCTURE OF THE ASIAN NIES

All the Asian NIEs have experienced remarkable growth during the last three decades and are currently undergoing industrial restructuring. Because of this common growth pattern, most Western literature has treated the economic success of the Asian NIEs as a group. Even though the Asian NIEs showed a similar growth pattern, there are apparent differences among them. Hong Kong and Singapore have been city states, whereas Korea and Taiwan were agricultural economies before 1960s and recently joined urbanized industrial economies. In spatial configuration, there is a similarity between Hong Kong and Singapore, but there are significant differences between the two city states in their industrial policies and firm strategies in pursuing industrial restructuring(Ho, 1993a; Lui and Chiu, 1993). There are also significant differences between Korea and Taiwan. For example, industrial conglomerates, *Jaebul*, have taken a significant role in the economic success of Korea, whereas small and medium sized firms have been more important in the industrial growth of Taiwan.

The coexistence of similarities and differences among the Asian NIEs in the process of growth can be seen in the industrial structures of the NIEs. First, structural changes of industries among the NIEs are compared, collapsing twenty eight ISIC three digit industries into five industry types.[2] They are 1)resource type; 2)assembly

Table 1. Industrial Structure (%) of Asian NIEs (Based on Employment Data)

Industry Type*	Hong Kong		Singapore		Korea		Taiwan**	
	85	88	85	89	85	90	85	90
Resource	4.3	5.0	9.7	6.9	13.2	12.8	14.2	13.3
Assembly	41.0	40.4	65.0	70.7	38.4	45.2	45.2	52.1
(Technology)	(290.3)	(21.6)	(42.3)	(50.0)	(199.2)	(24.0)	(19.9)	(24.9)
Labor	48.0	47.5	13.9	12.6	36.4	29.9	28.3	19.7
Capital	1.4	1.3	3.0	2.7	4.2	4.2	5.5	6.3
Other	5.3	5.8	8.7	7.1	7.8	7.8	6.8	8.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note:

* Resource(resource related type): food; wood; paper; petroleum and coal; non-metal; and non-ferrous.
Assembly(assembly type): fabricated metal; machinery; electrical; transport; professional goods; plastic; furniture; leather.
Technology(technology intensive type): machinery(ISIC 382); electrical(ISIC 383); Professional goods (ISIC 385).
Labor(labor intensive type): textile; apparel; footwear; rubber; other manufacturing(SIC 390).
Capital(capital intensive type): ind. chemicals; oil refineries; iron and steel.
Other(other special type): beverages; printing; other chemicals; pottery; glass.

** Classification of the industries in Taiwan is based on twenty industries (some of them are ISIC two digit).

Sources: United Nations (1991); Ministry of Labor (1992); Council of Labor Affairs (1991).

type; 3)labor intensive type; 4)capital intensive type; and 5)other special type. Most of the technology-intensive industries are included in the assembly type in this classification. This classification of industries is based on factor analysis and cluster analysis of structural changes and growth performance in Korea during the 1980s, using variables related to structure, capital/labor ratio, productivity, growth rate, etc.(Park, 1993a).

Because sthe classification is based on Korean industrial changes, the result of classification and the name of industry type may not be fully compatible with other countries. However, the classification reflects structural components of industrial changes and the method allows meaningful comparison of industrial structures among the Asian NIEs.

In general, assembly and labor intensive types are the most important industry types in the NIEs. The two industry types account for more than three quarters of the total manufacturing employment in each of the Asian NIEs. Assembly type is the leading industry type in Singapore, Korea, Taiwan, and the second largest in Hong Kong (Table 1).

Industrial structure of Singapore contrasts sharply with that of Hong Kong. Singapore is highly specialized in the assembly type. For example, electrical machinery industry (ISIC 383) alone, which includes electronics industry, accounts for 41% of the total manufacturing employment. This overwhelming specialization in the electrical machinery industry cannot be found in any other countries in the world. The dominance of technology intensive-industry in Singapore is, partly due to the industrial policy of the city state. Singapore initiated high wage policy in the late 1970s in order to redistribute workers from labor-intensive and low value added industries to high value added ones(Ho, 1993b; Rodan, 1980). The role of the state government

has been critical in industrial transformation of Singapore through its intervention in production and factor markets(Ho, 1993b).

Unlike Singapore, labor intensive industry type is dominant in Hong Kong's industrial structure. Assembly industry type is also important because it accounts for 40% of the total manufacturing industries, but the labor intensive industry type is more prominent than the assembly type in terms of employment share. The apparel industry alone accounts for more than 28% of the total manufacturing employment in Hong Kong. If the establishments with less than five employees are included, the share of the apparel industry reaches about 34% of the total manufacturing employment in Hong Kong(Chiu and Lui, 1993). The continuous growth of the labor-intensive industries in Hong Kong is seemingly related to indirect low wage policy. For example, the massive public housing program established since the 1950s helped subsidizing the wage of low income population; the employers are indirectly assisted to continue their pursuit of low wage, labor intensive industry(Chiu and Lui, 1993). Because of this indirect low wage industrial policy, Hong Kong's industry has been dominated by small, locally financed, and relatively unorganized firms, compared to Singapore(Chiu and Lui, 1993).

Industrial structures of Korea and Taiwan seem to be a mixture of the two extreme types in Hong Kong and Singapore. Considering the weights of the assembly and labor intensive types, industrial structure of Korea is relatively similar to that of Hong Kong, whereas industrial structure of Taiwan is comparatively similar to that of Singapore(Table 1).

Assembly industry type is dominant but the labor intensive industry type is still important in Korea. Industrialization in Korea was initiated by the rapid growth of labor intensive industries in the 1960s. However, during the last decade Korean industrial structure has transformed from the labor intensive to assembly type. The transformation has been dramatic since the mid-1980s and is related to the decline in comparative advantages of the labor intensive industries due to several factors such as high wages, shortage of production workers, and fluctuation of exchange rates(Park, 1993b and 1994). Since the mid-1980s, there are no significant changes in the share of resource type, capital intensive type and other special type, and only the assembly type has considerably increased its share at the expense of the labor intensive type in Korea.

Taiwan has a more specialized industrial structure toward the assembly type. Resource, capital intensive, and other special types in Taiwan are similar to those in Korea. The share of the technology intensive industry type in Taiwan is also similar to that of Korea(Table 1). However, the share of labor intensive type in Taiwan is much smaller than that in Korea and conversely, the share of the assembly type in Taiwan is relatively larger. Taiwan started structural transformation toward the assembly type much earlier than Korea, and industrial structure of Taiwan is more specialized in the assembly type compared to that of Korea. Other significant difference between Korea and Taiwan regarding their industrial structures is the role of small and medium sized firms. Small and medium sized firms have played a critical role in export-oriented industrialization in Taiwan(Tsay, 1993b), whereas large firms were the keys to the industrial development in Korea.

Even though there is some degree of variation, generally the Asian NIEs have been transforming from a labor intensive to an assembly intensive structure. There are also shifts toward

technology-intensive structure in all the Asian NIEs despite the differences in their pattern of industrial structure. It is clear that labor-intensive industries are recently undergoing rapid restructuring in all the Asian NIEs. The decline in the share of the labor intensive industry in the Asian NIEs is opposite to the trend in the ASEAN-four and China. The ASEAN-four and China have shown a relative growth in the labor intensive industrial type during the last decade.

III. INDUSTRIAL RESTRUCTURING AND FIRM STRATEGY ON LOCATION AND TECHNOLOGY

1. Industrial Restructuring and Firm Strategy

As Clark and Kim(1993) pointed out, major triggers of the industrial restructuring in the Asian NIEs are rapid increase in wages and labor shortages in production jobs(Ho, 1993a; Lim, 1993; Lui and Chiu, 1993a; Park, 1994; Tsay, 1993a). The role of state was critical for industrial changes and spatial restructuring in the rapid industrialization phase of the Asian NIEs during the 1960s through the 1980s(Markusen and Park, 1993; Song, 1990). Government policy is still significant for industrial changes and restructuring in Korea. For example, government policy renders a support for structural adjustment in certain industries. While government is still an important player in industrial restructuring of the Asian NIEs, firms and their strategies become more important as a means to achieve industrial competitiveness.

Confronted with the erosion of comparative advantage, especially in the labor intensive industries in the NIEs, firms have responded dynamically in the restructuring process. The dynamic restructuring process entails, singularly or in combination, changes in technology, location, organization, and local labor markets. Firm's competitive strategy in developing technology, selecting location, controlling labor, and organizing production systems have become more important than before in the dynamic restructuring process of the Asian NIEs. Survey results on industrial restructuring in Hong Kong, Pusan, Seoul, and Singapore sponsored by the East-West Center reveals the importance of dynamic firm strategies in the process of industrial restructuring(Kim, 1993b).

Utilization of flexible labor such as part-time or temporary workers and foreign workers has been adopted as a major strategy on labor in order to overcome problems with high wages and labor shortages in manufacturing in Hong Kong, Singapore, and Seoul metropolitan area(Ho, 1993b; Chiu and Lui, 1993; Park, 1993c). Subcontracting has been adopted by most of the firms in the major cities of the Asian NIEs as a competitive strategy. The main reason of the subcontracting strategy is to lower wages and labor costs, and accordingly, the subcontracting strategy is directly related to labor strategy(Ho, 1993b; Park, 1993c). Because of high wages and labor shortages, overseas investments in plants or factories are considered as a major locational strategy by many firms in the labor intensive industries(Kim, 1993b). According to the survey results sponsored by the EastäWest Center, considerable proportion of the firms in the major cities in the Asian NIEs have introduced new technology as part of their competitive strategy. While firm strategies on labor and organization are regarded as short term adjustment strategies responding to the problems of high wages and labor shortages in the Asian NIEs, major purposes of the introduction of new technology are to increase productivity and improve quality along with cost reduction. Productivity increase is the most important reason for the introduction of new technology, whereas

cost related factors are relatively less significant in the technology strategy compared to other firm strategies(Kim, 1993b).

Considering the reasons of the introduction of new technology in the major cities of the Asian NIEs, firm strategy on technology is very important for the future role of the Asian NIEs in the APRA. That is, the technology strategy is a long term adjustment strategy and can ultimately contribute to the improvement of quality of life in the Asian NIEs and other Asian Pacific Rim countries. Direct overseas investment strategy is also important for the future role of the Asian NIEs in the APRA. Because of the importance of firm strategy on technology and location for the future role of the Asian NIEs, firm's competitive strategies on technology and location are examined in detail in the following section.

2. Firm Strategies on Technology and Location: The Case of Korea

The industrial restructuring survey in Seoul sponsored by the East-West Center extended to include major industrial districts such as Kumi and Cheongju industrial complexes in Korea in order to explore firm strategies on location and technology in Korea. The survey was conducted in August and December of 1992, using a direct-visit method to individual firms with pre-designed questionnaire.

Total 600 firms were selected mainly from apparel and electronics industries by stratified random sampling from *Korea Business Directory* published in 1992. The apparel and electronics industries are selected as key industries because they can be regarded as representative industries of labor intensive and assembly types respectively. Out of 600 firms selected, 306 firms responded to the survey. About three quarters of the surveyed firms belong to the apparel and electronics industries.

Overseas direct investment is regarded as firm's reaction to the business environment in labor intensive industries. About 12% of firms in the sample invested in overseas plants during the last five years(Table 2). There is, however, considerable difference between the apparel and electronics industries. While more than one fifth of the firms in the apparel industry invested overseas, only 8% of those in the electronics industry did so during the last five years. The frequency of direct overseas investments is quite low compared to the case of Hong Kong and Singapore(Ho, 1993b; Chiu and Lui, 1993).[3] Direct foreign investment by Korean firms is a rather recent phenomena. More than half of direct overseas investment by the firms in the sample was made since 1989(Table 2). It is, however, noticeable that about one-third of the surveyed firms have plans to invest overseas in the next three years(Table 2). About 46% of the firms in the apparel industry and 29% of those in the electronics industry have plans for investment in overseas factories.

Lower wage cost is the most important reason for the current and future plan for direct foreign investment. Easier market access is also regarded as an important reason by more than half of the surveyed firms. However, it is viewed less important than before in the future plan for overseas investment; but, access to cheaper components and parts production is regarded more important than before for future overseas investment. The factor of cheaper land and availability of land is also regarded as one of the main reasons for overseas investment by some firms.

More than half of direct overseas investment of the sample firms have been made in Southeast Asia during the last five years(Table 2). For the

Table 2. Direct Foreign Investment(DFI) Characteristics of Surveyed Firms in Korea

	Apparel		Electronics		Total surveyed	
	Last5	Next3	Last5	Next3	Last5	Next3
Investment in overseas factories in last 5 years (in next 3 years):						
yes	21.0	(46.2)	8.3	(29.1)	12.0	32.2)
no	79.0	(53.8)	91.7	(70.9)	88.0	(67.8)
Years of DFI (% to total DFI)						
before 1985	-		4.2		1.5	
1986-1988	48.4		29.1		41.8	
after 1989	51.6		66.7		56.7	
Areas for DFI						
Southeast Asia	40.0	(40.0)	50.0	(28.9)	52.9	(35.2)
North America	13.3	(2.9)	16.7	(7.9)	11.8	(4.5)
China	13.3	(28.6)	16.7	(228.9)	11.8	(29.5)
Asian NIEs	6.7	(25.7)	16.7	(21.1)	8.8	(22.7)
Others	26.7	(2.9)	-	(13.1)	14.7	(8.0)
Total	100.0	(100.0)	100.0	(100.0)	100.0	(100.0)
Reasons for DFI						
lower wage costs	87.5	(100.0)	75.0	(80.0)	85.7	(90.0)
easier access to markets	50.0	(32.4)	75.0	(55.0)	54.3	(46.7)
cheaper land and availability of land	18.8	(20.6)	8.3	(12.5)	17.1	(15.6)
cheaper components and parts production	-	(14.7)	8.3	(25.0)	5.7	(21.1)
fewer labor problems	6.3	(8.8)	-	(10.0)	2.9	(7.8)
currency revaluation	6.3	(2.9)	-	(5.0)	5.7	(4.4)

Note: All the numbers in the table are percentages.
Last5: Cases for DFI during the last 5 years;
Next3: Cases for DFI plan in next 3 years;
* The numbers are percentages of firms which regarded the factor as the important reason to the total number of firms responded.
Source: Survey results.

future direct overseas investments, however, less proportion of the firms regard Southeast Asia as an appropriate area for investment. Instead, China appears as an important destination for future direct foreign investments. Asian NIEs are also regarded as appropriate areas for future investment by considerable proportion of the surveyed firms. It is apparent that APRA becomes more an important area for direct overseas investments by Korean firms in the future.

Introduction of new technology is one way of rebuilding comparative advantages. About two-thirds of the surveyed firms introduced new technology during the last two years(Table 3). In general, introduction of new technology is more important in the electronics industry than in the apparel industry. The introduction of new technology is also more important for the firms which have made or have plans for direct overseas investment than for those which have not invested or have no plan to invest in overseas factories.

The type of new technology introduced during the last two years is mainly concerned with production technology(Table 3). Production

Table 3. Technology Strategy of Surveyed Firms in Korea

	DFI*	No-DFI*	Total
Introduction of new technology in last2 years			
yes	74.5	60.3	65.6
no	25.5	39.7	34.4
Type of new technology:			
production	62.0	76.9	70.5
design	20.3	5.8	12.0
quality control	15.2	13.5	14.2
office	2.5	2.9	2.7
other	-	1.0	0.5
total	100.0	100.0	100.0
Sources of new technology:			
imported	51.3	42.6	46.2
domestically developed	25.6	17.6	21.0
in house developed	23.1	39.8	32.8
total	100.0	100.0	100.0
Main purpose of new technology introduction:**			
improve product quality	68.4	72.6	70.8
increase output	68.4	68.9	68.6
produce new products	44.3	62.3	54.6
to reduce wage costs	27.8	22.6	24.9
to cut material/energy costs	19.0	19.8	19.5
to cut labor costs	20.3	6.6	12.4
to reduce supervisory costs	12.7	9.4	10.8

Note:

* DFI represents the surveyed firms which have invested in factories during the last 5 years or have plans for DFI in next 3 years;
No-DFI represents the surveyed firms which have no DFI and no plan for DFI in next 3 years.

** The numbers are percentages of firms which regarded the factor as the main purpose toú¬he total number of firms responded.

Source: Survey results

technology has been more important for the firms which have not invested or have no plan to invest in overseas plants. Some firms in the sample introduced new technology for quality control. A considerable proportion of the firms which have made or have plans for direct foreign investment introduced new design technology. About 46% of the surveyed firms replied that the technologies they introduced during the last two years were imported(Table 3). Firms which have made or have a plan for direct foreign investment are more dependent on imported technology.

Main purposes of the introduction of new technology are to improve product quality, to increase output, and to produce new products(Table 3). Some proportion of the surveyed firms consider that cost related factors such as reducing wage costs, material or energy costs, labor costs, and supervisory costs as the main reasons for introducing new technology. However, the cost related factors are less important, compared to those related with product quality, productivity, and production of new products. The responses to the question about the

Table 4. NIEs' Trade Relations

	Amount of Trade(US $ million)			Growth rate per year(%)	
	1980	1985	1991	1980-85	1985-91
NIEs-China	6,586	18,026	67,579	22.6	24.6
NIEs-ASEAN	17,772	18,785	53,847	1.1	19.2
NIEs-NIEs	6,953	9,073	37,896	5.5	26.9
NIEs-Japan	28,345	35,874	102,518	4.8	19.1
NIEs-U.S.	34,571	57,796	126,068	10.8	13.9
NIEs-Others	80,575	99,101	302,221	4.2	20.4

Sources: IMF, 1987 and 1992, Direction of Trade Statistics; The Republic of China, 1988 and 1992, Monthly Statistics of Exports and Imports.

reasons for introducing new technology indicate that technology strategy is apparently different from the other firm strategies. Firm's competitive strategy on technology is not much related to the reduction of costs, but highly related to quality of product, productivity, and new product development in the process of industrial restructuring.

The firm strategies on location and technology suggest that direct overseas investments and technological development of the Asian NIEs are the important issues in understanding their ongoing industrial restructuring. Effective utilization of industrial restructuring in the NIEs will bring benefits to the NIEs and other developing regions in the APRA.

IV. ROLE OF THE ASIAN NIES IN THE ASIAN PACIFIC RIM AREA

Firm strategies on location and technology in the process of industrial restructuring suggest two significant directions for the role of the Asian NIEs in the APRA: industrial cooperation and technological development. Recent trend in rapid increase of direct foreign investment by the NIEs in the APRA can be positively applied for the enhancement of economic cooperation and industrial progress of the less industrialized regions within the area. Technology strategy allows fast diffusion of technology and increase in productivity. The technology development strategy of the Asian NIEs can ultimately improve quality of life in the area as a whole.

Considering the fact that international competition becomes more intense for the Asian NIEs than before because of the emergence of regional economic blocs within the major industrialized markets, industrial cooperation and technological development are critical for the survival of the Asian NIEs in the future. In addition, there exists a significant complementarity among the countries in the APRA. The functioning of the European Community as a single economic entity and the formation of NAFTA will bring more pressure to the Asian NIEs to find alternative markets and to forge closer linkages with neighboring countries(Kim, 1993c). The trend of closer linkages with neighboring countries is already shown in the NIEs' trade relations. There is a significant increase in the trade volume between the NIEs and China as well as among the NIEs themselves(Table 4). We discuss several specific roles and strategies below according to the premise that economic cooperation and technological development are the main directions for the future role of the Asian NIEs in the APRA.

Table 5. Direct Foreign Investment in China by Country/Region (US $ million)

Year	Japan	NIEs					U.S.	Total
		Total	H.K.	Korea	Singapore	Taiwan		
Cum. 79-83	955	4,373	4,319	na	54	na	860	7,453
1984	203	2,238	2,175	na	63	na	165	2,875
1985	471	4,210	4,134	na	76	na	1,152	6,333
1986	210	1,586	1,449	na	137	na	527	2,834
1987	301	2,017	1,947	na	70	(100)	342	3,709
1988	276	4,127	3,467	(3.4)	137	(520)	370	5,297
1989	439	3,718	3,160	(9.8)	111	(437)	641	5,600
1990	457	4,872	3,833	46 (54.5)	103	890 (984)	358	6,596
1991	812	8,897	7,215	138 (84.7)	155	1,389 (759)	548	11,977
1st half 1992	826	11,413	9,703	171	219	1,320	810	14,533

Sources: MOFERT and requoted from JETRO Newsletter No. 102, 1993, P. 19. Figures within parenthesis from Bank of Korea (1992) for Korea and from Chiu and Chung(1992) for Taiwan.

1. Formation of New Industrial Spaces

There are two apparent trends in the evolution of new industrial spaces in the APRA; establishment of free economic zones and integration with neighboring countries in developing industrial districts. Many free economic zones have been successfully developed in Southeast Asia during the last two decades. In recent years, several free economic zones have been proposed in the Northeast Asia region. They are Greater Vladisvostok Free Economic Zone; Hunchun Economic Zone; Rajin-Sonbong Free Economic Zone; Suifenhe Economic Zone; Amur River Free Trade Zone; and Manzholi Economic Zone(Kobayashi, 1992). In addition, there are several open cities in the Bohai rim area of China.

Another trend is the development of transnational industrial spaces with neighboring economies. In recent years, the city-states of Hong Kong and Singapore have been aggressively pursuing economic integration with neighboring economies. Given the reversion of Hong Kong back to China in 1997, the future of Hong Kong depends on how the integration will proceed. Against the future uncertainty, Hong Kong has been aggressively investing in China, especially in neighboring Guangdong Province of China(Table 5). It is hoped that Hong Kong will gain bargaining power with Beijing through economic expansion and integration with its immediate hinterland(Kim, 1993b). In addition, direct investment in immediate hinterland by firms in Hong Kong is a result of firm-level competitive strategy in the process of industrial restructuring. Singapore has been equally aggressive in forming an integrated industrial space with neighboring economies. SIJORI-linking Singapore with Johor of Malaysia and Riau of Indonesia-symbolizes such effort. Securing hinterland for industrial production and essential supplies is vital for the survival of Singaporean economy.

Unlike Hong Kong, Taiwan has been a reluctant investor with respect to China so far. Because of cautious investment behavior on the part of Taiwan, most Taiwanese investment in China so far has been in small- and medium-scale, labor-intensive operations(Kim,

Table 6. Korea's Investment in China: Regional Distribution of Cumulative Total at the End of 1992

	Cases	Amount($000s)	% share of investments
Bohai Rim	77	78,032	47.1
Beijing	18	7,379	4.5
Tianjin	13	15,505	9.4
Heibei	3	2,495	1.5
Shandong	43	52,653	31.8
Northeast	74	57,573	34.7
Liaoning	37	24,730	14.9
Jilin	17	6,954	3.9
Heilongjiang	20	25,889	15.6
Southeast	29	29,886	18.0
Shanhai	1	900	0.5
Guangdong	17	12,935	7.8
Fujian	2	7,384	4.5
Zhejiang	2	3,237	1.7
Jiangsu	5	4,630	2.8
Hainan	2	800	0.4
Other regions	1	190	0.1
Total	181	165,681	100.0

Sources: Unpublished data provided by Korea Institute for Industrial Economics and Trade.

1993c). However, Taiwanese investment in China has been rapidly rising across the strait in recent years(Table 5). Improvement in China-Taiwan relations will increase the volume and size of investment toward China. There was a considerable level of trade between China and Korea even before the establishment of diplomatic relations. Following the trade and investment agreements signed in 1992, trade volumes and investment have been increasing between the two countries. Unlike other Asian NIEs, Korea's investments in China are mainly directed toward the Bohai rim area and Northeast China because of its closeness in physical distance and historical relations(Table 6).

Considering the two trends described above and firm strategy on location in the process of industrial restructuring in the Asian NIEs, the NIEs can take a role in the formation of new industrial spaces through direct foreign investments in the APRA. The formation of new industrial spaces can be initiated by developing new industrial districts. Considering the firm strategy on location in the industrial restructuring process of the NIEs, the development of new industrial districts may have a beneficial effect on both Asian NIEs and their neighboring economies. The new industrial districts need not be a Marshallian industrial district with flexible specialization. They may be a satellite industrial complex in which business structure is dominated by large, externally owned firms, a hub industrial district in which business structure is dominated by several large, vertically integrated firms

surrounded by many supply firms, or other types of industrial district. However, the new industrial districts should be specialized in one or a group of industries in order to successfully utilize local environments and dynamic comparative advantages. Then, new industrial spaces can be developed in association with the specialized new industrial districts. Within the industrial spaces cities and districts can be functionally differentiated.

2. Bridging the Technology Gap

In the industrial restructuring process, technological development has been regarded as an important firm-level competitive strategy. Without technological improvement, rebuilding international competitiveness for the Asian NIEs may be impossible in the long term. Since the developing regions in Pacific Asia need more of medium technologies rather than advanced ones which can be obtained only from the advanced economies, the NIEs have more complementarity with the ASEAN-four and China. But the complementarity would not last long unless the NIEs move up the technology ladder. Moving up the technology ladder by the Asian NIEs is imperative for their survival and to improve overall level of technology in the developing regions of APRA. However, upgrading technology through technology transfer from the advanced economies such as the United States and Japan will not be easy because of the increasing technology protectionism in the industrialized countries. In addition, given the relative size of the Asian NIEs' economies, high-tech development in each one of the NIEs will not be easy. Therefore, cooperative policies and strategies are necessary for the NIEs in order to take a role of bridging the technology gap in the APRA.

The Asian NIEs should positively support technological development and innovation in a few fields and at the same time they should actively promote international collaboration for technological development. The Asian NIEs, especially Korea and Taiwan, now support technological development at the state level and the ratio of R&D expenditure to GNP has increased considerably during the last decade. However, in order to overcome size disadvantages of the NIEs, collaborative research and technological development in specific fields among the countries in the APRA should be supported and promoted. Specific fields of technological development can be decided based on the NIEs' comparative advantage in the future.

The internationalization of technological development through collaborative research can be promoted even at a city level. For example, collaborative activities in R&D, education, and training can be promoted among the three capital cities-Tokyo, Seoul, and Beijing, all of which have more than ten million population. Exchange programs for scholars, scientists and engineers, and managers can be collaboratively developed among the three large cities. Similar programs focusing on other major cities in the Asian NIEs can also be developed to promote and diffuse technological development and innovation.

The development of Business Information Support System(BISS) for small and medium size firms can be promoted in order to improve innovation and economic performance. The BISS attempts to establish business infrastructure to promote cross-national links and to improve the performance of local firms(UNCRD, 1992). Public institutes and local governments in the Asian NIEs should support the establishment of the BISS. Small and medium size firms in the Asian NIEs can improve innovation potential and contribute to the diffusion of technology by

participating in the BISS. Improving innovation potential and technology diffusion through the operation of the BISS is one way of bridging the technology gap between Japan and the developing region in the Asian Pacific area.

3. Integration of Dynamic Regional Industrial Systems

Formation of new industrial spaces and upgrading technology in the APRA cannot be successfully accomplished without utilization of regional networks based on complimentary relations in the area. Broadly, there exist complementary relations between the NIEs and other Asian economies, especially China and ASEAN-four. However, the complementary relations are not constant over time. From a long term perspective, dynamic complementary relations in the area should be developed based on dynamic regional industrial systems, in which the NIEs have both vertical and horizontal industrial linkages with the developing regions. Each of the Asian NIEs can contribute to develop the dynamic regional industrial system based on cooperation, networking, and utilization of the complementarity.

Four subregional industrial systems can be developed focusing on the NIEs in the APRA; a growth triangle centering around Singapore; the Greater South China, a region comprising Hong Kong, Guangdong, Fujian and Taiwan; the Yellow Sea Rim region comprising Northeast China, Bohai rim area, North Korea, and South Korea; and the Sea of Japan/East Sea rim area comprising Russia Far East, eastern part of Korean peninsula, and western Japan. Each of these four subregions has complementary relationship within APRA in terms of resources, labor, industrial and management technology, and industrial production. In each region, major resource area, new industrial districts, and major cities should be closely integrated with each other through linking operating units of the industrial systems. For example, a new industrial district in the Bohai rim area should have strong backward linkages to their local hinterland of resource base and forward production linkages to nearby major industrial areas in the Yellow Sea Rim area. In addition, the new industrial district in the Bohai rim area can have strong linkages in technology, high level producer services, and managerial functions with major metropolitan areas of Korea.

Asian NIEs can take a critical role in the development of the four subregional industrial systems, which should have a few specialized industrial sectors respectively. The four regional industrial systems, however, cannot be separated from each other. They should be dynamically integrated through business and information networking and collaborative activities in R&D , training, etc. Japan can take a leading role in the integration of the regional industrial system. The integration of the regional industrial system in the APRA can ultimately be linked to the American Pacific rim area and Oceania. Asian NIEs can also take a critical role in bridging the Pacific.

V. CONCLUSION

We have discussed industrial restructuring and firm strategies on location and technology in the Asian NIEs and the future role of the Asian NIEs in the APRA. After the three decades of continuous growth, the Asian NIEs are now in transition and undergoing industrial restructuring. Even though there are differences in the pattern of industrial structure among the Asian NIEs, industrial structure of the Asian NIEs has been transforming from labor intensive structure to technology intensive and assembly type structure. Confronted with high wages and labor shortages

in the Asian NIEs, firms in the NIEs have responded dynamically in the industrial restructuring process. Firm strategies in the NIEs, particularly with respect to location and technology, suggest two important directions for the role of the NIEs in the future: economic cooperation with neighboring countries and technological developments. The strengthening linkages with the neighboring economies already appear in the actual pattern of international trade and overseas investments by the NIEs.

Three major roles of the Asian NIEs in the Pacific Asia have been suggested according to the industrial restructuring and firm strategy in the Asian NIEs as well as the trends of international trade, overseas direct investments, and industrial district formations in the APRA. They are formation of new transnational industrial spaces, bridging the technology gap in the APRA, and integration of dynamic regional industrial systems. The major premises of the three roles are economic cooperation and technological development of the NIEs. The position of the Asian NIEs in managing these roles are, however, not stable. Unlike advanced economies, which have already established technological base and thereby are able to maintain safe distance from developing economies, the Asian NIEs do not enjoy a comfortable lead over ASEAN-four and China. The relatively small size of economies in the Asian NIEs is another factor that make the NIEs' position unstable in the global economy. Concerted efforts among the government, industry, firms, and community are necessary for securing the NIEs' role in the Pacific rim area and the global economy.

The three roles of the NIEs are not independent but they are interrelated. However, the development of industrial spaces is the first step in achieving the other roles. Industrial integration through the formation of transnational industrial space with neighboring economies is already emerging and needs to be strengthened. Moreover, social and economic barriers should be lowered and at the same time transportation and communication networks need to be improved. In this regard, Singapore's recent efforts to form a growth triangle with neighboring economies provide a good example(Ho, 1993a). The role that the Singaporean government has played in the growth triangle indicates a model for the other NIEs-how can the state make strategic interventions in a complex international economic arena.

We have focused on the analysis of industrial structure and firm strategy with regard to industrial restructuring of the Asian NIEs. Future research with regard to the role of the NIEs may focus on government's role in the industrial restructuring process of the NIEs and technology transfer in the APRA. In addition, case studies on actual formation and development of the industrial spaces and inter-firm networks within the industrial space are also required to clarify the future role of the Asian NIEs in the Pacific rim area.

Notes

1) Restructuring in the study in "an attempt to remake the comparative advantage of a firm, industry, region or nation"(Clark, 1993).
2) Industrial structure of the Asian NIEs are examined based on ISIC three digit data of employment. In case of Taiwan, twenty industries(some of them are two digits) are used in the classification.
3) In Singapore more than 63% of firms in the apparel and electronics industries have invested in overseas factories, while in Hong Kong about 40% of firms in those industries have invested during the last

five years.

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아시아-태평양 지역내에서 산업구조재편과 아시아 신흥공업국의 역할

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요약

본 논문은 아시아-태평양 지역내에서 아시아 신흥공업국의 미래 역할과, 입지와 기술적 측면에서의 산업구조 개편과 기업 전략에 대해서 분석한 것이다.

지난 30여년간 지속적인 경제 성장을 이룩해온 아시아 신흥공업국들은 이제 산업구조개편이라는 변혁을 겪고 있다. 각 나라간의 산업구조의 패턴 차이는 있지만, 전체적인 변화는 노동집약적 구조에서 기술집약적, 조립형태 구조로 바뀌어가고 있다. 아시아 신흥공업국내 고임금과 노동력 부족이라는 현상에 대해 기업들은 산업구조개편이라는 과정을 통해 능동적으로 대처하고 있다. 이러한 기업전략은 특히 입지와 기술에 관련하여 앞으로의 2가지 중요한 방향을 제시하고 있다. 인접국가간의 경제 협력과 기술의 발전이 그것이다. 인접국가간의 경제 연계 강화는 이미 국가간 직접투자와 교역의 실제적인 측면에서 나타나고 있다.

산업 구조개편과 기업전략에 따른 아시아-태평양 지역내 아시아 신흥공업국들의 3가지 주요한 역할이 제시되고 있는데, 그것은 국가간 신산업공간의 형성, 아시아-태평양 지역내 기술격차의 극복, 지역산업체계의 능동적인 통합들이다. 이 3가지 역할의 중요전제 조건이 되는 것이 국가간 경제 협력과 기술의 발전이다. 그러나 이러한 역할을 수행하는 것이 꼭 안정적이지는 못하다. 이미 기술적 기반을 확립하여 개발도상국들과 안전한 격차를 벌여놓고 있는 선진국들과는 달리 아시아 신흥공업국들은 동남아시아 4개국과 중국에 대해 안정적으로 리드를 지키고 있지 못하고 있는 사실과 더불어, 아시아 신흥공업국들의 상대적으로 작은 경제 규모가 세계 경제 내에서 그 위치를 불안하게 만드는 또 다른 요인이다. 따라서 정부, 산업, 기업, 지역 공동체간의 협조적 노력이 세계 경제와 아시아-태평양 지역내 신흥공업국의 위치를 고수하도록 하기 위해 필요하다.

신흥공업국의 3가지 역할은 상호 독립적이 아니고 서로 연관되어 있다. 그러나 산업 공간의 발전이 다른 역할들을 이루는데 있어서 첫번째 단계이다. 인접국과의 국가간 산업 공간을 통한 산업 통합의 현상은 이미 나타나고 있으며, 앞으로 더 확대되어야 한다. 또한 국가간 사회·경제 장벽이 더 낮춰져야 함과 동시에 교통·통신망의 연계가 더 원활해져야 한다. 이런 면에서 볼때 싱가폴의 노력은 좋은 모델을 제시하고 있다(Ho, 1993a).

우리는 아시아 신흥공업국들의 산업구조개편과 관련하여 산업구조와 기업 전략 분석에 초점을 맞추었다. 앞으로의 연구는 아시아-태평양 지역내 기술이전과 구조개편 과정에 있어서의 정부의 역할에 관심이 모아질 수 있다. 덧붙여, 실제 산업공간 형성과 발전, 산업공간내 기업간 연계의 사례 연구가 앞으로의 신흥공업국들의 역할을 명확히 밝히기 위해서 필요할 것이다.

주제어 : 산업구조개편, 아시아-신흥공업국, 기업전략, 신산업공간.

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