Development of Dynamic Industrial Systems in Northeast Asia[1)]

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Contents

I. Introduction

During the last two decades, development of dynamic business organizations, production systems and new

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1) This paper was written during the author's stay at Project on Regional and Industrial Economics, Rutgers University as a visiting Professor.

technologies have contributed to the evolution of dynamic industrial systems and emergence of new industrial spaces. Traditionally, industrial spaces were considered only within the national context. However, with relatively easy international movement of capital and technology transfer there has been a trend towards the evolution of industrial spaces beyond the national boundary. Considering recent dominant trends of international politics, the development of industrial spaces beyond the national boundary seems to continue to progress in the rest of the 1990s and at the dawn of the 21st contury.

According to Scalapino(1992: 22-25), there exist three broad trends of international politics today. That is, first, to achieve rapid economic growth, or to ensure steady growth in the case of advanced industrialized societies, is the primary goal of all states, irrespective of political system. Second, there is a general movement toward greater political openness in connection with the priority given economics. Finally, the third broad trend relates to changing relationships between and among countries and the complex configuration of international politics.

The above three trends of international politics are obvious in the Northeast Asia today. Emphasis on economic development, a trend towards political and economic openness, and establishment of new relationships among countries in the northeast Asia will surely contribute to regional economic cooperation. There are many common cultural features throughout the Northeast Asia on the one hand. On the other hand, therd exist significant differences in the level of economic development, in the endowment of resources and in the political and economic systems among the countries in the Northeast Asia region.

Differences in political and economic systems and political barriers can be regarded as unfavorable conditions in the economic cooperations in the Northeast Asia. However, the differences in resource endowments and the level of development can be a basis for regional cooperation in the Northeast Asia. There are many complementarity among the countries in the Northeast Asia region in using resources, capital, labor and technology because of the differences among the countries in the region. Considering the recent trends of international politics, favorable conditions for economic cooperation may outweigh the unfavorable ones (Min, 1991).

The critical question is how we can successfully exploit the favorable conditions for economic cooperation in order to produce discernable benefits to all the countries involved and, in addition, how we can mitigate the political barriers through the utilization of favorable conditions. Many projects and ideas for economic cooperation among the countries in the Northeast Asia have been discussed among the scholars and government officials in the region. Regional development of the Yellow Sea rim, Development of Eastern Sea/Sea of Japan rim, Tumen River basin development project, development of Rajin and Sonbong special economic zones, and economic development of the Russian Far East are some examples of the recent discussions(Kim, 1991; Kim and Campbell, 1991; Kim, Campbell, Valencia, and Cho, 1992). Most of the discussions are mainly focused on individual projects and therd are not enough discussions on the way of integration of the individual projects and ideas.

Organization of industrial spaces with dynamic industrial systems can be one way of integrating the separate projects to promote economic cooperation. The major purpose of this paper

is to discuss the development of dynamic regional industrial systems, which can enhance regional competitive advantages and regional industrial spaces. Industrial structure, resources and comparative advantages in the countries of the Northeast Asia region are examined in order to discuss the dynamic industrial systems in the region.

II. Industrial Structure of the Countries in the Northeast Asia Region

1. Northeast Asia Region

Northeast Asia is a dynamic region comprising some part of Chian, Japan, Mongolia, North Korea, South Korea and some part of Russia. There is a considerable consensus in the inclusion of the countries of Japan, Mongolia, North Korea and South Korea in the Northeast Asia region, but there is no clear definition of parts of China and Russia. Northeast China[2] and Russian Far East[3] are included in Northeast Asia Region in most of the studies on the region.

I agree with the inclusion of Northeast China and Russia Far East to Northeast Asia region, but I strongly assert that Bohai rim of China and eastern Siberia should be included in Northeast Asia region. Bohai rim area of China comprises Beijing, Tianjin, Hebei, Shandong, and Liaoning[4] and this area

2) Northeast China, in general, comprise provinces of Liaoning, Jilin, Heilongjiang, and Inner Mongolia.

3) Russian Far East includes Maritime Kray, Khabarovsk Kray, Amur Oblast, Kamchatka Oblast, Magadan Oblast, Sakjalin Oblast, and Yakut ASSR.

traditionally had a close relationship with Korea. Inclusion of the Bohai rim area to the Northeast Asia region is also very important for successful progress of the economic cooperation in the region and for mediating political barriers among the countries in the region. Eastern Sigberia is less developed but has considerable potentials for future development and cooperation with abundant resources. Furthermore, eastern Siberia facilitates the access to Russian Far East and Northeast China than Russian core region.

In this study, Northeast Asia region is loosely defined as a region comprising Japan, North Korea, South Korea, Mongolia, northeastern China, Bohai rim area of China, Russia Far East, and eastern Siberia. This definition is not for data analysis of the region but for discussion of the development of dynamic industrial systems in the region. Even though the region defined as above, most analysis of data are limited to country level since comparable data for the Provincial level in China and Russia are not always available.

2. General Economic Structure

Population of the Northeast Asian region as a whole, defined in the previous section, is more than 485 millions, which is much larger than those of EEA or NAFTA. There are significant differences in the size of ecomomy, per capita GDP, and the degree of dependence on external sectors among the countries in the Northeast Asia region(Table 1). Per capita GDP ranges from more than U$ 25,000 in Japan to about U$

4) This definition of the Bohai rim area is based on Tong, Li He, Fan, Qu, and Zhao(1991).

300 in China and the ratio of trade volume varies from 56.2% in South Korea to 6.3% in Russia. The rapid increases of GDP and exportes of China[5] with her open door policy suggest a possibility of rapid increases in GEP and trade volumes even in North Korea and Mongolia due to the progress in the economic cooperation among countries of the region.

Table 1. General Economic Indication

	Population 1991 (mil)	GDP 1990 (U$ bil)	GDP per capita 1990	Export 1990 (U$ bil)	Import 1990 (U$ bil)	Trade Value/ GDP(%)
China	1,143.3	338.8	289	62.1	53.3	34.1
Japan	123.6	3,123.5	25,273	286.9	234.8	16.7
North Korea	21.8	21.5	987	2.1	2.6	21.8
South Korea	43.2	239.7	5,569	65.0	69.8	56.2
Mongolia	2.2	1.9	522	0.4	0.5	47.4
Former USSR	289.0	1,346.0	4,664	44.2*	40.0*	6.3
Northeast China**	121.4					
Bohai rim***	165.1					
Russian Far East	8.0					
Northeast Asia Region	485.3					

Notes: * With only non-socialist countries
** Includes Provinces of Liaoning, Jilin, Heilongjiang and Inner Mongolia
*** Includes Beijing, Tianjin, Hebei and Shandong

Sources: World Bank (1992); State Statistical Bureau of the People's Republic of China (1991); Campbell (1992); Sekiguchi (1992); Korea Institute of Industrial Economics and Trade (1991); Far Eastern Economic Review(1992)

There also exist significant differences in economic structure. Primary sector is still dominant in the share of total labor forces, whereas tertiary sector is poorly developed in both

5) Annual average growth rates of GDP and export of China in the period from 1980 to 1990 were 9.5% and 11% respectively(World Bank, 1992).

China and North Korea(Table 2). Russia and North Korea promoted industrialization, especially focusing on heavy industries, from the early decades of the postwar era and this emphasis on industrialization resulted in the large share of labor force in the secondary sector(Oshima, 1992). The shares of the tertiary sector in China and North Korea are very low. Tables 1 and 2 indicates that industrial productivities of the socialist countries are considerably lower when compared to the capitalist countries of Northeast Asia region. This is due to the fact that in socialist countries per capita GDPs are low despite the large share of industrial labor force. These differences in economic structure and productivity can be the basis for future economic cooperations in the region.

Table 2. Economic Structure of NE Asian Countries (%)

Countries	Primary	Secondary	Tertiary
Share of Total Labor Forcess(1991)			
China	60	25	15
Japan	7	36	57
North Korea	43	39*	18
South Korea	17	34	49
Mongolia	19	28	43
Russian Far East	8	51	41
Share of GDP(1990)			
China	23.4	52.9	23.6
Japan	2.4	36.9	60.7
North Korea	26.8	56.0	17.2
South Korea	9.5	44.2	46.3
Mongolia	n/a	n/a	n/a
Russia	n/a	n/a	n/a

Note: * Includes only manufacturing

Sources: Korea Institute of Industrial Economics and Trade (1991); Oshima (1992); Hwang (1992)

3. Industrial Structure

Industrial structures of the countries in the Northeast Asia region are examined based on ISIC three digit data. Since comparable data for Mongolia and North Korea are not available, only data for four countries are analyzed in this paper

For convenience, twenty eight industries are grouped into five industry types: 1) resource type; 2) assembly type; 3) labor intensive type; 4) capital intensive type; and 5) other special type. This classification of industries is based on the analysis of structural changes and growth performance in the 1980s using variables related to structure, labor/capital ratio, productivity, growth, etc. (Park, 1993b). Because the classification is based on Korean industrial changes, the classification system and the name of the industry type may not be appropriate for other countries. However, the classification is meaningful in the consistent comparison of industrial structure among the countries in the Northeast Asia. Moreover, since Korean economy is now in between a highly industrialized country like Japan and a developing country like China, classification scheme based on structure of the Korean industry can be reasonably applicable to both industrialized and developing economies.

Assembly type is the dominant industry type in all four countries. Japan is highly specialized with assembly type industries, while China is least specialized with that industry type(Table 3). The dominance of assembly type industries in Russia(51.4%) is almost similar to that of Japan(52.7%), but the electrical machinery industry, including electronics, is more important in Japan. The share of assembly type industries in

Table 3. Industrial Structure of NE Asian Countries* (1990)

ISIC	employment share(%) of each industry			
	China (1990)	Japan (1989)	South Korea (1990)	Former USSR (1989)
311 food	8.1***	10.3	5.5	8.8
331 wood	1.3	2.8	1.3	2.3
341 paper	2.2	2.3	1.9	0.8
354 Petrol & coal	0.5	0.1	0.4	0.5
369 non-metal	7.1	2.9	2.8	6.4
372 non-ferrous	1.6	1.1	0.8	1.4
Resource Type	20.8	19.5	12.8	20.2
323 leather	1.4	0.4	1.5	0.5
332 furniture	0.8	1.5	1.1	1.8
356 plastic	1.8	4.1	3.5	0.4
381 metal	3.3	7.9	7.8	24.3
382 machinery	18.1	12.2	7.5	
383 electrical	6.0	16.5	15.2	12.7
384 transport equip	3.7	8.2	7.3	9.6
385 professional goods	1.2	1.9	1.3	2.1
Assembly Type	36.3	52.7	45.2	51.4
321 textile	13.6	5.9	12.4	4.7
322 apparel	3.0	4.4	7.8	6.6
324 toot wear		0.3	4.5	1.4
355 rubber	1.4	1.3	2.2	0.9
390 other ind.	7.7	1.9	3.1	3.2
Labor Intensive Type	25.7	13.8	29.9	16.8
351 ind. chemicals	7.6	1.6	1.6	4.0
353 petrol refinery	0.9	0.2	0.4	0.5
371 iron & steel	5.5	3.1	2.2	3.2
Capital Intensive Type	14.0	4.9	4.2	7.7
313 beverages	-***	0.7	0.7	0.9
314 tobacco	-	0.1	0.0	0.1
342 printing	1.8	5.1	2.8	0.8
352 other chemicals	1.5	2.0	3.0	1.0
361 pottery	**	0.6	0.5	0.7
362 glass	-**	0.6	0.8	0.4
Other Special Type	3.3	9.1	7.8	3.9
Manufacturing Total	100.0	100.0	100.0	100.0
(# of emp. in. mil.)	(54.68)	(10.96)	(3.14)	(31.45)

Note: * Data for Mongolia are not comparable and for North Korea are not available
** ISIC 361 and 362 are included in ISIC 369
*** ISIC 313 and 314 are included in ISIC 311

Sources: United Nations(1991); Ministry of Labor, ROK (1992); State Statistical Bureau, China (1991)

Table 4. Industrial Structure of NE Asian Countries * (1985)

ISIC	employment share(%) of each industry			
	China (1990)	Japan (1989)	South Korea (1990)	Former USSR (1989)
311 food	8.4***	9.8	5.8	8.4
331 wood	1.0	3.0	1.5	2.2
341 paper	1.9	2.3	2.0	0.9
354 Petrol & coal	0.4	0.1	0.4	0.5
369 non-metal	7.5**	2.9	2.9	6.5
372 non-ferrous	1.4	1.1	0.5	1.4
Resource Type	20.6	19.2	13.2	19.9
323 leather	1.4	0.4	1.4	0.6
332 furniture	0.9	1.5	1.1	1.8
356 plastic	1.6	3.7	3.1	0.4
381 metal	3.3	7.6	8.2	24.2
382 machinery	20.3	12.0	5.4	
383 electrical	11.2	15.9	12.5	12.7
384 transport equip		8.7	5.4	9.7
385 professional goods		2.1	1.3	2.2
Assembly Type	38.7	51.9	38.4	51.6
321 textile	13.5	6.5	15.8	5.0
322 apparel	2.8	4.2	10.0	6.5
324 toot wear		0.3	3.0	1.5
355 rubber	1.4	1.3	3.7	1.0
390 other ind.	6.2	2.1	4.0	2.6
Labor Intensive Type	23.9	14.4	36.4	16.6
351 ind. chemicals	7.6	1.7	1.7	4.0
353 petrol refinery	0.7	0.2	0.3	0.5
371 iron & steel	5.8	3.6	2.2	3.2
Capital Intensive Type	13.9	5.5	4.2	7.7
313 beverages	-***	0.7	0.8	1.1
314 tobacco	-	0.2	0.0	0.1
342 printing	1.6	5.0	2.5	0.8
352 other chemicals	1.3	1.9	3.0	1.0
361 pottery	**	0.7	0.6	0.7
362 glass	-**	0.6	0.9	0.4
	-			
Other Special Type	2.9	9.1	7.8	4.1
Manufacturing Total	100.0	100.0	100.0	100.0
(# of emp. in. mil.)	(42.12)	(10.89)	(2.40)	(32.92)

Note: * Data for Mongolia are not comparable and for North Korea are not available
** ISIC 361 and 362 are included in ISIC 369
*** ISIC 313 and 314 are included in ISIC 311

Sources: United Nations (1991); Ministry of Labor, ROK (1987); Stat Statistical Bureau, China (1991)

South Korea(45.2%) is less than that of Japan or Russia, but industrial composition within the assembly type in South Korea is similar to that of Japan.

Labor intensive type is the second important industry type in both South Korea and China. Textile industry is dominant in the labor intensive type in both China and South Korea. The labor intensive type is relatively less important in both Japan and Russia. Resource type is less important in South Korea than the other three countries. Capital intensive type has more shares in China and Russia than in South Korea and Japan. In the other special type, printing industry has considerable share in Japan but it is less significant in Russia and China.

Considering the recent industrial structure of the four countries, Two significant characteristics can be identified: 1) a contrast between capitalist countries and socialist countries on the one hand, and 2) a contrast between industrialized and developing economies on the other. More important characteristics can be found from changes in the industrial structure.

During the period of 1985 to 1990, industrial structure has changed from labor intensive type dominant structure of South Korea changed significantly, while that of Russia showed almost no change(table 3 and 4). China showed considerable changes and Japan had only slight changes. The important characteristics are in the direction of changes in the assembly type and the labor intensive type. South Korea and Japan showed an increase in the share of the assembly type, whereas China and Russia showed a slight decrease in the share of that industry type(Table 3 and 4). The trend of changes in the labor intensive type is opposite to that of assembly type. In South Korea and Japan the share of labor intensive type decreased, whereas it increased in China and Russia. There is a

considerable contrast in the trend of changes between capitalist countries and socialist countries in the Northeast Asia region. The contrast is more significant between South Korea and China.

Table 5. Share of Major Industrial Resources in Bohai Rim and Northeast China

	Share of Output in 1990(%)				
	Coal	Crude Oil	Natural Gas	Pig iron	Timber
Beijing	0.9	0.0	0.0	5.8	0.0
Tiianjin	0.0	3.4	2.4	2.2	0.0
Hebei	5.7	4.1	1.9	8.4	0.5
Shandong	5.6	24.2	9.4	4.6	2.6
Liaoning	4.7	9.9	13.3	18.4	1.5
Jilin	2.4	2.6	0.6	1.1	10.7
Heilongjiang	7.7	40.2	14.7	1.0	26.9
Inner Mongolin	4.4	0.0	0.0	4.5	9.4
Sub Total	31.4	84.4	42.3	46.0	51.6
China Total	100.0 (1,080 mil.t)	100.0 (138.3 mil.t)	100.0 (15,298 mil.cu.m)	100.0 (62.4 mil.t)	100.0 (55.7 mil.cu.m)

Source: State Statistical Bureau of the People's Republic of China(1991)

During the last decade, South Korean industrial structure has changed from labor intensive type dominant structure to assembly type dominant one. The changes have been more dramatic since the mid 1980s and South Korean industry is now undergoing through a significant restructuring because of high wages, shortage of production workers and fluctuation of exchange rates(Park, 1993a and 1993c). Overseas direct investments, changes in production systems, emphasis of flexible labor, and changes in business organization are the

major firm strategies on industrial restructuring in South Korea today(Park, 1993d). The process of industrial restructuring in South Korea and direction of changes in the industrial structure of China and Russia suggest the existence of obvious complementarity among the countries in the Northeast Asia region. Industrial structure of socialist countries in the Northeast Asia region. Industrial structure of socialist countries in the Northeast Asia will change with more emphasis on the labor intensive type. There is a possibility of dramatic changes in industrual structure of China and North Korea toward a more labor intensive type in the coming decade.

III. Resources and Comparative Advantages in Northeast Asia Region

Japan and South Korea are mostly dependent on external natural resources for industrial development because their natural resource bases are very poor. However, considering Northeast Asia as a whole, there exists a comparative advantage in mineral resources, in forest products and in maritime resources(Campbell, 1992). There are abundant natural resources in the socialist countries in Northeast Asia region, especially in Northeast China, Siberia, and Russian Far East. There exists a significant complementarity in the resources in the countries or areas of Northeast Asia region.

Northeast China and Bohai rim area of China together produce more than 84% of the Chinese total crude oil production and more than half of national timber production(table 5). The two areas also produce about 42% and 46% of

Chinese total natural gas and pig iron productions respectively. Heilongjiang province in the Northeast China is highly specialized in the production of crude oil, natural gas, and forest products and Shandong province in the Northeast China is highly specialized in the production of crude oil, natural gas, and forest products and Shandong province in the Bohai rim area is considerably specialized in crude oil and natural gas productions. Liaoning province, which can be included both in Northeast China and the Bohai rim area, is specialized in pig iron and natural gas productions.

Northeast China and the Bohai rim area also have abundant and relatively qualified labor forces. Northeast China and the Bohai rim area have higher proportion of the highly educated people than any other areas in China.[6] In the occupational composition, Northeast China has a large number of professional and technical personnel and the area would be a potential source of inexpensive skilled and unskilled labors for Northeast Asia region(Kim, 1992).

Even though comparable data for Russian Far East and eastern Siberia can not presented here, these areas have abundant mineral resources. Russia is the top producer of petroleum and natural gas in the world and about 90% of the resources are in Siberia(Korea Institure of Industrial Economics and Trade, 1992). Siberia is also a top producer of iron ore in the world[7] and abundant of many other important mineral resources. Russian Far East has also rich mineral deposits,

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6) In educational attainment of population, the share of senior highschool and more to total population is 9.3% in China as a whole, whereas it is about 14% in the Northeast China(See Kim, 1992).

7) Russia shares 44% of world's iron deposit and one qyarter of production(Korea Institute of Industrial Economics and Trade, 1992).

including oil and natural gas. Forest resources are also abundant in Russian Far East and Siberia and Russian Far East surely contribute to complementarity with other areas within Northeast Asia region.

North Korea has considerable deposits of mineral resources such as iron ore and bituminous coal. North Korea has also a relatively high proportion of highly educated people compared to China. Mongolia has an agricultural comparative advantage and has considerable forest resources(Campbell, 1992). Japan and South Korea lack in their natural resources but they have abundant qualified human resources. The diverse characteristics in the distribution of mineral resources, forest products, and human resources in each area or country in Northeast Asia region suggest the existence of diverse comparative advantages and complementarity within the region.

Campbell(1992) analyzed regional comparative advantages in Northeast Asia based on detail exports data. According to his analysis, Northeast China has comparative advantages in raw materials such as crude petroleum, natual gas, and timber, resource based industry, and heavy industry such as steel and motor vehicles. Campbell's findings in Northeast China are quite consistent with the resource bases of the area. Based on the export data, Northeast China has no comparative advantage in labor intensive industries. However, Bohai rim area seems to have comparative advantage in the labor intensive industries. All the provinces in Northeast China have higher proportion of heavy industry, whereas Tianjin and Shandong province in Bohai rim area have higher shares of light industry than national average(Table 6).

Table 6. Bohai Rim of China and Northeast China: Population and Manufacturing, 1990

	Population 1990 (mil. persons)	Regional Share(%)	Total manufacturing employment (thousand persons)	1990 Regional share(%)	Share of light industry(%)
Beijing	10.8	(0.9)	1,602	(2.5)	37.9
Tianjin	8.8	(0.8)	1,465	(2.3)	51.6
Hebei	61.1	(5.3)	3,040	(4.8)	38.7
Shandong	84.4	(7.4)	3,935	(6.2)	47.8
Liaoning	39.5	(3.5)	5,407	(8.5)	31.0
Jilin	24.8	(2.2)	2,515	(3.9)	35.7
Heilongjing	35.4	(3.1)	4,063	(6.4)	32.6
Inner Mongolin	21.5	(1.9)	1,475	(2.3)	32.5
Subtotal	286.3	(25.0)	23,502	(36.9)	37.4
China	1,143.3	(100.0)	63,777	(100.0)	41.6

Source: State Statistical Bureau of the People's Republic of China(1991)

North Korea has comparative advantages, based on analysis of export data, in clothing and mineral resources(Campbellm 1992). However, if North Korea opens her door, key export products may be changed. Since exports data in Mongolia are very limited, comparative advantages based on export data can not be analyzed. Partial manufacturing data, however, reveals that Mongolia has some comparative advantages in labor intensive industry and wood products.[8] Complete export data for Russian Far East are not available, but major export items in this area are basic mineral products(Campbell, 1992).

Trade structure and industrial structure of a region may reveal comparative advantages of the region. However, caution

8) Based on partial data published in Industrial Statistical Yearbook (United Nations, 1991), textile, apparel, leather, and footwear industries and wood products and furniture industries share about 40% and 14% of total manufacturing employment in Mongolia respectively.

is needed in interpretation of the comparative advantage based on static data because the comparative advantage of a region is not constant and may vary over time. The changes of industrial structure of the contries in Northeast Asia from 1985 to 1990, reviewed in the previous section, suggest the dynamic notion. Comparative advantage can move toward higher level of technology and capital intensity as a country develops and accumulates capital and technology(Hwang, 1992).

IV. Development of Dynamic Industrial Systems

Industrial structure and comparative advantages examined in the previous sections are mainly related to production units. Production unit is, however, one of several operating units of industrial systems. Control and managerial functions of firm headquarter, research and development functions, producer services, and production functions are interrelated operating units of industrial systems. Traditionally, these operating units are all in the same site of a single plant firm. In modern industries, however, the operating units have a trend of spatial separation because each operating unit has distinctive locational requirements. For example, headquarters tend to concentrate in the core region of a nation, whereas manufacturing plants of mass production tend to locate in peripheral areas where cheap labor is available. Many multinational corporations have their headquarters and R & D units in the core regions of industrialized countries, while locating their production plants all over the world(Smidt and Wever, 1990). Accordingly, in order to promote economic cooperation in

Northeast Asia, not only the comparative advantages with relation to industrial and export structure but also industrial systems concept should be integrated.

Industrial structure, comparative advantages, and locational requirements of the operating units of industrial systems can be effectively used for developing dynamic industrial systems in Northeast Asia. That is, locational requirements of each industry type, those of each operating unit, and regional characteristics can be synthetically considered for development of regional industrial system in Northeast Asia.

There are several restrictions in the promotion of economic cooperation in Northeast Asia regions. They are 1) political barrier among the countries within Northeast Asia, especially between North and South Korea; 2) poor infrastructures which require tremendous capital invenstments to improve it; 3) variation in local labor markets with different levels of educational and skill attainment; and 4) different political and economic systems. Because of these restrictions, integrated regional industrial system can not developed at once, but hierarchical and partial integration model is more preferable.

Considering dynamic aspects of industrial structure and comparative advantages, local characteristics, and some restrictions, the following hierarchical and partially integrated regional industrial systems should be promoted. The hierarchical and partial integrated industrial systems can be regarded as dynamic regional industrial systems because it is not static and can be dynamic in reacting to various external factors in the global economy. The development of dynamic regional industrial system will contribute to the development of all countries and areas within the Northeast Asia region with promotion of mutual economic cooperation and gaining

competitive advantages in the global economy.

1. Formation of Strong Linkages among Tokyo, Seoul, and Beijing

Formation of strong linkages of high technology, producer services, and corporate headquarters among three world cities of Tokyo, Seoul, and Beijing is priority in the development of dynamic regional industrial systems in Northeast Asia region. The three cities are all among the largest worldwide capital cities with a population of more than ten millions, and are located closer to each other than any other similar population size cities in the world. These three world cities are all primary centers of high technology industry, R & D activities, control and management functions of multinational and multiregional corporations, and high level producer services in each country(Park, 1991; Takehuchi, 1991; Wang, 1993). Establishment of strong linkages among the three capital cities can definitely enhance international competitiveness in high technology development and lead to overall cooperation among the countries and areas in the Northeast Asia region.

In order to establish strong economic linkages among the three world cities, the following cooperative activities should be progressed. First, direct airline connections among the three capital cities should be established. Airline services are critical for linkages of high technology industry, R & D activities, and headquarter funcitions in modern society. Second, collaborative activities in R & D, education, and training should be positively promoted to enhance innovation potentials. Third, exchange programs for scholars, scientists and engineers, and managerial workers should be developed among the three cities

in order to diffuse technological information and innovations. Lastly, functions of management, R & D, and high level producer services can be enhanced with the promotion of direct investments among the countries of the Northeast Asia region.

2. Establishment of Free Economic Zones

Because of different political and economic systems and limited capital, development of free economic zones can be an initial progress in economic cooperation among the countries in Northeast Asia region. The free economic zones are centers for investments of production units. Each free economic zone has to specialize one or two priority industries which have comparative advantages with regard to its resource base, labor market, and industrial structure.

Presently, six free economic zones have been proposed in Northeast Asia region. They are 1) Greater Vladivostok Free Economic Zone; 2) Hunchun Economic Zone; 3) Rajin-Sonbong Free Trade Zone; and 6) Manzhouli Economic Zone(Kobauashi, 1992). In addition there are several open cities in Bohai rim area such as Dalian, Qinhuangdao, Tianjin, Yantai, and Qingdao.

All of these proposed free economic zones and open cities can not be successfully developed in near future. Four free economic zones in Northeast Asia region, respectively one in each area of Bohai rim, Northeast China, Russian Far East, and North Korea, can initially be developed. Each area can select one or two primary industries respectively from labor intensive and assembly type industries in Bohai rim area, capital and resource intensive industries in Northeast China, labor/assembly type industries in North Korea, and resource related industries in Russian Far East. Production activities in

the four free economic zones should have forward production linkages to industrial areas of Japan and South Korea as well as to their hinterland areas for the supply of input resources and labor. Considering the fact that most of Korean firm's invenstments to China are directed to Bohai rim and Northeast China, close linkages of free economic zones in these areas with South Korea can be easily established(Table 7). The four free economic zones can be now industrial districts in coming decade. Additional development of free economic zones in interior can be considered after initial establishment of the four free economic zones.

Table 7. South Korea's Investment in China: Regional Distribution of Cumulative Total at the End of 1992

	Cases	Amount ($000s)	% Share of Investment
Bohai Rim	77	78,032	47.1
Beijing	18	7,379	4.5
Tianjin	13	15,505	9.4
Hebei	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
Sotheast	29	29,886	18.0
Shanghai	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

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

3. Development of Collaborative Economic Zones in Border Areas

In border areas larger economic zones with collaboration of several countries can be developed. The collaborative economic zones are higher level than free economic zones and contain more diversified economic functions. They should include production zones, free trade zones, businesss office zones, and other collaborative activity zones including technology development, education, training, etc. The collaborative economic zones should have linkages to more broader hinterland areas for supply of resources and labor, major production areas of the relevant nation, and major industrial areas of Japan and South Korea.

Tumen River Basin Area Project has been intensively discussed in recent years. Tumen river basin area is a strategic one because it is a border area of China, North Korea, and Russia. Presently, UNDP takes a leading role in the discussion and coordination of the project. The Tumen river basin area can be developed as a collaborative economic zone and can have strong linkages to Japan and South Korea as well as the bordering three countries. Border area of China and North Korea centering in Sinuiju can also be a strategic location for the development of a collaborative economic zone. This area can have strong linkages to major industrial areas of Northeast China, Bohai rim area, North Korea, and South Korea on the one hand. On the other hand it can have strong linkages to large cities in Bohai and Yellow Sea rim areas and even Taiwan and Hong Kong in terms of production, technology and services. These collaborative economic zones can be centers of new industrial spaces in East Sea/Sea of Japan rim and Yellow Sea rim areas.

4. Integration of Dynamic Industrial Systems

Development of free economic zones, collaborative economic zones, and linkages among the three worldwide cities can not be promoted separately. They should be hierarchically interrelated to each other. Free economic zones should have strong backward linkages to their local hinterland and forward production linkages to nearby industrial areas in Yellow Sea rim area and East Sea/Sea of Japan rim area. In addition, the collaborative economic zones can have strong linkages in the areas of technology, producer services, and managerial functions with the three world cities and other major metropolitan areas in the Northeast Asia region.

The three world cities should have production, R & D, and high level service linkages with the collaborative economic zones and major metropolitan areas in Northeast Asia region on the one hand. On the other hand they should have strong relationship with major cities in Southeast Asia region. The three world cities should take on the roles of both integrating Northeast Asia region with dynamic industrial system and competing with other econimic blocs in technology and management.

V. Conclusion

The major purpose of this paper is to discuss the development of dynamic industrial systems in Northeast Asia in order to enhance economic cooperation among the countries of Northeast Asia region and international competitiveness in the global economy. Industrial structure, resources, and

comparative advantages are examined before discussing the dynamic regional industrial systems. Partial integration of dynamic regional industrial system is premised because of different political and economic systems and limited capital. Establishment of strong linkages among the three worldwide capital. Establishment of strong linkages among the three worldwide capital cities, development of free economic zones, and development of collaborative economic zones in border areas are discussed. Hierarchical linkages among three world cities, free economic zones, and collaborative economic zones with relation to operating units of industrial systems are emphasized for integration of the dynamic industrial systems and organization of industrial spaces.

The dynamic regional industrial system in Northeast Asia region can surely enhance economic cooperation within Northeast Asia region and competitive power in global economy. However, considering recent trends of global political economy, economic cooperation among the countries in Asia Pacific rim area seem to be very important in the long term. Furthermore, economic cooperation in the whole pacific rim area becomes more important as many new industrial spaces are developed in the area. Integration of dynamic regional industrial systems in Notheast Asia region may move up economic cooperation in Pacific rim area and Pacific era in the 21st century.

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