Economic and Industrial Development of Pohang: Efforts for Restructuring 포항의 경제 및 산업개발: 재구조화를 위한 노력

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한글요약

철강산업 중심의 포항에서 단일화된 산업구조에 대한 불안은 예전부터 존재하여 왔음. 지금 포항의 철강은 중국의 값싼 제품들에 의해 도전을 받고 있고, 국내에서도 서해안의 새로운 철강도시가 상대적으로 유리한 지리적인 이점과 함께 철강업체의 유치에 성공하고 있어 미 래에 대한 불안감이 커지고 있음. 또한 포항은 수도권에서 멀고, 국내외 주요도시들과의 연 계성도 좋지 않은 편이라서, 무언가 특별한 처방이 없다면 철강산업도시로서 지금까지 누려 왔던 번영을 더 이상 기대할 수 없음을 우려하고 있음. 현재 포항은 경쟁력있고 지속가능한 도시로 살아남기 위한 여러 방안들을 추진하고 있음. 우선은 혁신적인 기술개발을 통하여 철강제품의 품질과 가격경쟁력을 높이려 노력하고 있고, 산업구조를 다양화 및 전문화하기 위하여 POSTECH, RIST 등의 R&D의 기능과 포항테크노파크의 첨단기술접목의 생산기능 등을 최대한 활용하기 위하여 노력하고 있고, 영일만항과 배후단지 건설 등을 통하여 환동 해권 중심의 국제무역도시로서의 기능을 강화하기 위하여 노력하고 있음. 이러한 노력들이 포항의 4대 성장엔진의 틀을 통하여 추진되고 있으나, 여전히 필요한 것은 좀 더 구체적이 고 실효성 있는 전략과 행동계획임. 포항은 또한 세계적인 철강도시였던 '키타큐슈'와 '피츠 버그'에서의 경험들, 철강산업의 변화와 재구조화전략 등에 대해서 배워하고, '로테르담'이나 '싱가포르'등 세계의 주요 항만도시에서 항만을 어떻게 개발하고 운영하고 있는지, 항만클 러스터를 어떻게 형성했는지, 자유무역지구를 어떻게 개발했는지 배워야 할 것임.

주요어: 재구조화, 다양화, 특성화, 지역혁신제도, 항만클러스터

ABSTRACT

There has been concerns about the steel oriented industrial structure of Pohang. Growth of cheap Chinese steel products has become a major challenge for Pohang. Domestically, other industrial city in the west coast attracts industries with better geographic advantages. Pohang is far from the capital city region, and its connections to the major cities in Korea and Northeast Asia are not convenient yet. Thus, there have been concerns that Pohang may not be able to maintain its prosperity as a representative steel industrial city in the future without a special prescription. In order to survive as a competitive and sustainable city, Pohang tries to restructure its industries through diversification and specialization utilizing its assets of prominent R&D institutions and technopark, and to improve the global city and/or international trade functions to be a center of the East-Sea Rim area along with Youngilman Harbor under construction. POSCO itself tries to upgrade its quality and reduce production costs of steel products by developing innovative technologies. Such efforts as these have been promoted through the four growth engines in Pohang. However, more detailed guidelines and action plans are needed for better performances. Traditional steel industrial cities like Kitakyushu and Pittsburgh would provide good insights for Pohang to restructure its industries. Also, Pohang could learn from Rotterdam, Singapore and other port cities, which were successful in port operation and supporting area development. From these port cities, Pohang could learn how their port clusters were formed and how free trade zones were established.

Keywords: Restructuring, Diversification, Specialization, Regional Innovation System, Port Cluster

1. Introduction

In the era of globalization, all the cities and regions are exposed to global competition. Since it is located between China and Japan, cities and regions in Korea are confronting more serious impacts of globalization. Korea is just sandwich between two countries in terms of technological and price competitions.

Pohang, a representative industrial city, is also struggling for survival. International treaties that are related to the World Trade Organization(WTO) and Green Round are imposing burdens to industries. Major steel companies such as POSCO are being challenged by Chinese companies in terms of price and quality. Because of the geographical advantages on the west coast, some steel companies plan to relocate their facilities to a newly developing west coast city from Pohang, a traditional steel industrial city in the east coast. Of course, Pohang itself tries to alleviate these problems and establish various strategies.

The purpose of this study is to analyze problems, prospect, and policy directions of Pohang, which wants to be developed as a prosperous and sustainable city in the era of globalization and global competition. This study will focus on economic and industrial regeneration and/or restructuring of Pohang, which is known to be a representative steel industrial city and also being confronted with challenges from the world market.

Najin
Chungjin

Donghae

Niigata

Pohang

Tottory

Busan

Kobe

Fukuoka

Illinininin

Direction of Development
East-Sea Rim
Economic Bloc

Figure 1. Location of Pohang in the East-Sea Rim Area

Source: Koo (2004).

2. Facts about Pohang

Pohang, a representative steel industrial city along with POSCO, is located on the south-east coast of the Korean peninsula. The City of Pohang has a population of half a million and has large land mass, which is 1.8 times the size of Seoul. In the mid 1960's, Pohang was a small city with 65,000 of population and land area was around 1/7 of the current one. Pohang started to grow since the construction of POSCO started in 1968.

Pohang has contributed to its region's and the nation's economic development for the past 30 years. POSCO is still enjoying its heydays in 2005 with the highest profits, even under the challenges of Chinese steel products. Pohang also has the nation's first class research facilities and related human resources in Pohang University of Science and Technology(POSTECH), Pohang Research Institute of Science and Technology(RIST), and Pohang Accelerator Research Laboratory. Currently a NANO Research Center and a Life Science and Engineering Research Center are under construction.

The Gross Domestic Products(GDP) of Pohang in the year of 2000 was 657 billion Won(\$0.65 Billion), and per capita income was 12.9 Million Won(\$12,000). The proportion of Pohang from Gyeongbuk Province was 22.3% in terms of its GDP. Per capita income of Pohang was 5% higher than Gyeongbuk's and Korea's.

Table 1 GDP of Pohang, Gyeongbuk Province, and Korea

(Billion Won, Thousand Won)

		1998	2000	2005	2010
Korea	GDP	442,334	578,664.5	632,399	812,017
	Per Capita GDP	9,527	12,260	12,874	16,042
Gyeongbuk	GDP	27,286	33,624	41,803	56,855
Province	Per Capita GDP	9,932	12,368	13,537	16,774
Pohang	GDP	6,079	6,567.3	9,660.0	12,762
	Per Capita GDP	11,850	12,904	15,610	19,634

Source: Pohang Vision 21(2001), The Third Gyeongbuk Comprehensive Plan(2000).

Note: \$1 is around 1,050 Won in 2005, while 1,200 Won in 2000. Because of the IMF, \$1 was 1,500-1,700 Won in 1998.

In 2004, based on the number of employees, the first sector industry was 0.2%, the second sector industry 29.8%, and the tertiary sector industry 70%. It was 0.2%, 46.7%, and 53.3% in 1991. Proportion of secondary

sector industry was peak in 1991. The number of employees in the secondary sector industry has been decreasing continuously since 1995.

Table 2 Changes of Industrial Structure in Pohang

(#Persons, Percent)

	1991		1995		1999		2004	
	#Firms	#Employees	#Firms	#Employees	#Firms	#Employees	#Firms	#Employees
Total	17,192	106,778	29,419	151,070	31,125	134,565	34,328	153,370
lotai	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
First Industry	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2
Secondary Industry	12.0	46.7	9.9	39.6	8.6	32.5	9.2	29.8
Tertiary Industry	88.1	53.3	90.1	60.3	91.3	67.4	90.7	70.0

Source: Statistics of Pohang (Each Year).

Table 3 Industrial Estates in Pohang

(Thousand m², #Persons)

		Area	#Firms	#Firm Operating	#Employee	Category
POSCO		8,891	1	1	9,341	National
	1st District	3,930	73	71	8,487	Local
Steel	2nd District	3,996	91	84	3,816	Local
Industrial	3rd District	2,611	62	58	2,595	Local
Estate	Chung Rim	588	5	5	1,085	Local
	Sub-Total	11,125	231	218	15,983	
Chung Ha Nong Gong		195	22	21	268	Ag-Industrial
Total		20,211	254	240	25,592	

Source: City of Pohang, April 2004.

Korea's regional unbalanced development has been a serious problem. Seoul and its surrounding areas have been growing much faster than any other regions and has been monopolizing most of the prosperities of the peninsula. Over the last 30-40 years, Korean government has tried to accomplish a balance in the development of its country by adopting various policies including the development of massive industrial estates at the non-capital city region. Of course, through these polices, Pohang as well as Ulsan has been developing as

a representative of industrial cities. However, overall efforts of the balanced development have not been very successful. The primacy of the capital city area overwhelms other areas in terms of its population, industry, and culture.

Comparatively, Pohang has been enjoying economic prosperity since the 1970's, 80's and 90's. In these years, Pohang's steel industry was a symbol of modernization of Korea along with the heavy-chemical industries in Ulsan. However, as world markets changed rapidly under the influence of globalization, technological advancement, and as growing environmental concerns, the status of Pohang has been shaken. Pohang started to worry about the steel oriented industrial structures because of cheap Chinese steel products. Also, Pohang has worried about internalizing costs of pollution reduction facility and/or environmental friendly production. The population growth in Pohang has stopped at its peak with 510, 000 people for ten years. This could indicate the unstability of Pohang's future.

In the mid 1990's, Pohang established a visionary development goal, 'Clean Sea, Pure Dream, and Green Pohang' and set the four engines for development to establish a foundation for local industry to be competitive in the national and international markets. The four engines are: building a high-tech steel industrial city, a high tech science city, a central port city of the East-Sea Rim area, and marine cultural touristic city.

East-Sea Rim Daegu · Kyungbuk Central City Port City **Pohang** Four Engines of U-Shape Green-Life For Pohang Movement Development High-tech Marine · Cultural High-tech East-Sea Rim Science and Steel City Logistics Center Touristic City Industrial City

<Figure 2> Goals for Growth of Pohang

Source: Koo(2004).

3. Efforts for Economic and Industrial Development

3.1 Industrial Diversification

Pohang established four engines of development to establish a foundation for becoming a competitive and sustainable city. These goals are to be implemented through such efforts as establishing the Pohang Technopark, constructing the Youngilman Harbor, establishing a free trade zone, building a NANO Research Center, and pursuing a Material R&D Valley. These efforts are to diversify and restructure the economy and industry of Pohang.

To effectively implement these following strategies, followings should be considered; first, practical and effective strategies have to be developed continuously, integrating four engines of development with major national policies such as regional innovation system, regional specialization, and industrial cluster. Second, it is recommended to study the industrial cycles and industrial restructuring of Kitakyushu and Pittsburgh, which had similar industrial structures with Pohang. Third, Rotterdam, Yokohama, and Singapore, which have been successful in revitalizing their economies through the development of the sea-ports and their supporting areas, have to be benchmarked.

Currently, under the situation of the aggressive challenges of Chinese steel products in lower prices, POSCO seems to handle difficult situations very well through its development of new technologies and the reduction of production costs. However, in the near future Pohang's steel industry may follow the cases of Kitakyushu and Pittsburgh, which experienced their steel industries withered and employees were layed off. Thus, POSCO also has to diversify its business and develop new technologies as well as reduce production costs. While the city of Pohang attempts to restructure industries and activate economy and business.

In the 1980's, under the changes of supply and demand structure in the world market and appreciation of Yen, the Yahata Steel Factory of the New Nippon Steel Company tried to reduce the size of its steel industries and expand new business areas such as information technology, engineering, new materials, bio-technology, and urban development. Kitakyushu communities established 'Kitakyushu Renaissance Plan', of which theme was 'Establishing international technology city with water, green, and meeting', and tried to overcome the region's economic depreciation (Tataharu, 1989).

Under the oil crises in the 1970's, steel production in America quickly reduced

and the US Steel also had to shut down its factories during 1970's and 80's and tried to diversify its business. An example of this was the energy related business. The city of Pittsburgh agreed for the shut down of factories and tried to restructure its industry and develop the vision of the city. It proposed its development vision of industry, business, international trade, and human support environments, and established detailed road-maps for high-tech, finance, and service industries (Giarratani, Rushen, Singh, 1994).

While POSCO is trying to diversify its business items, the City of Pohang also has to make efforts to diversify its industries in such fields as information technology, bio-technology, and material industry, establish an international logistic center, and improve city image and tourism through downtown waterfront development. Even though being a medium size industrial city in the local area far from the capital city region, Pohang has the top quality R&D institutions such as POSTECH, RIST, and Accelerator Research Laboratory, and a high-tech venture production system, the Pohang Technopark. Also, Handong Global University is well known for its internationalized college education and international law school. With these assets, Pohang has to try to be developed as a globalized logistic city and technopolis of new concept.

As to emphasize again, if such efforts are not performed in appropriate ways, Pohang's future will be despairing. The four engines of development have to be pursued with proper road-maps and implementation strategies. The Korean government's major development strategies such as regional innovation system, regional specialization, and technopark policies have to be integrated into the four engines of development. We can also say that the efforts for industrial diversification in Pohang has not yet shown impressive progress, even though such policies and strategies have started five to ten years earlier. Thus, we can say again that some modified efforts under righteous directions of local and central governments are required for implementing such strategies effectively.

3.2 Regional Innovation, Industrial Cluster, and Technopark Policies

According to Schumpter(1939), innovation is the main source of dynamism in a capitalist economic development, where as neo-classical economics stress the significance of 'price competition,' innovation represents 'quality competition.' Over the past decades, innovation, understood as product, process and organizational innovation in the firm as well as social and

institutional innovation at that level of industry, region and nation, has come to be considered as being fundamental to economic growth (Simmie and Kirby, 1998).

Cooke et al. (1998) defines a regional innovation system as a system in which firms and other organizations are systematically engaged in the interactive learning through an institutional milieu characterized by embeddedness. Asheim and Isaksen(1997) add that a regional innovation system consists of a production structure (techno-economic structures) and an institutional structure (political- institutional structures).

The industries' spatial agglomeration or cluster matters for industrial competitiveness. Through the performance of The Third Italy's industrial and regional development, Piore and Sabel(1984) explain the advantage of clustered firms in coordination and competition in a local area. Porter(1990) through the book, 'The Competitive Advantage of Nations', argues that the national competitiveness is lead by a few regional industrial clusters. Lyons(2000) argues, "at the heart of recent industrial district literature is the notion of dynamic agglomeration economies, or the local connectedness beyond market or hierarchy in the relationship between firms which results in high levels of innovation, growth, and competitiveness within an industrial district".

Korean government tries to establish regional innovation system, industrial cluster, and regional specialization policies very actively for last several years. For implementing regional innovation system, Korean government tries to establish and/or seek technological innovation, local R&D bases, venture firms, new specialized industries, administrative innovation through local networking, local industrial hierarchical cooperation, and local embeddedness. For implementing industrial cluster policies, Korean governments designated 23 area's special industries such as electronics, steel, and tourism, which have comparative competitiveness. The industrial cluster policies have been implemented tentatively, but will be extended to 23 area projects until 2008.

Even though started earlier years, the technopark polices, we can say, are also based on such concepts as regional innovation, industrial cluster, and regional specialization. The technopark polices had been started for the purpose of regional economic development based on network and cooperation between region's R&D institutions and local industries.

The Korean government established a plan for the Daedeok Science Town

in 1973 and was completed in 1992. This is the first tentative attempt in establishing a technopolis which include agglomerated high-tech industrial estates along with cooperation of local universities and research centers.

During the late 1990's, they designated six representative technoparks including Songdo, Ansan, Gwangju, Daegu, Gyeongbuk, and Chungnam, The Ministry of Science and Technology along with other parties is focusing on establishing technoparks along with physical infrastructure supports. It also supports firm operation, firm location, industry-university coordination for enhancing small firms innovation abilities (Kim et al., 2001).

The technopark and the technopolis could be differentiated in terms of its scale and character. The Korean government in the short run seems to be focusing on small scale technoparks due to the lack of financial resources and probably for a modest approach from a smaller scale. Technopark could start on a small scale, step by step with good outcomes the technopark's innovative functions could be incorporated to traditional industries and city functions forming a modest technopolis (Koo, 2003).

Pohang Technopark is located in Pohang on the east coast of Gyeongbuk Province. Pohang Technopark was initiated by Pohang City, POSCO, and POSTECH. Compared to other technoparks, Pohang Technopark is not designated as the pilot sponsored central government project. It is now established on 33.7 acres of land area and with a \$40 million initial investment. Until 2011, 648 acres of land will be developed as a technopolis, which includes five functional areas: R&D, international, cultural, educational, and residential functions. Pohang Technopark's major programs are: business incubation, cooperative research and development, education and training, information networking, and firm supporting system including venture capital company and venture firm sponsoring.

Pohang Technopark is established with the following purposes:

- ① Utilizing research abilities of universities and research institutes in the area
- 2 Making local industries produce a high value and added products through industrial clustering
- 3 Establishing a local friendly technopark to boost its local economy

Last four years, sales volume increased impressively. In 2001, the number of firms in Pohang Technopark was 33 and sales volume was 14.8 Billion Won(\$12.3 Million). In 2002, the number of firms increase to 40, employees

225, and sales volume 19.5 Billion Won(\$16.3 Million). Sales volume increased to 65.6 Billion Won(\$60 Million) in 2003, and 100 Billion Won(\$95 Million) in 2004.

According to Pohang Technopark administrative office, the following are the major problems in operating this technopark.

- ① Lack of governmental financial support: To maintain administrative offices and initiate own programs, operational funds are necessary.
- ② Lack of venture capital: Currently most firms' requests are venture fund through technopark.

Other technoparks in Korea also have such problems. In addition, it has been a general finding that Korean technoparks' were not very successful in terms of networking and R&D cooperations with local institutions and universities(Kwon, 2001, Koo, 2003). It is also noticed that Pohang Technopark's association or cooperation with local R&D institutions and industries was not very significant, and its regional economic multipliers were not significant yet. Because of its establishment only five years ago, it may be too early to analyze its performance.

Pohang has to well integrate technopark policies with the regional innovation and specialization policies. Pohang Technopark has to well cooperate with the prominent R&D institutions such as POSTEC and RIST. These integrated policies would be a major source for Pohang to establish knowledge-based high-tech industries and to restructure industries.

3.3 Youngilman Harbor and Its Supporting Area Development

Youngilman Harbor construction has started since 1995, and was planned to be completed in 2011. Based on the investment of \$1.7 Billion, sixteen 30,000 ton level vessel pier (or Container 430,000 TEU)would be completed. However, the construction has been delayed because of the government's Busan-Gwangyang two port system development and difficulties of inviting private sector participation. From 2005, the construction of Youngilman Harbor became more active. Construction of four container piers and two general piers is started in full scale (City of Pohang, 2005)

Youngilman Harbor's supporting area development wes also delayed

accordingly. The first phase of development started in 2003 and will be finished in 2010, and the second phase development will be finished until 2020 (City of Pohang, 2005). Following are some more details about Youngilman Harbor:

- ① In order to increase the port related industries and port users convenience, the port supporting area will be developed hosting various services and manufacturing such as logistics, storage, display, market, assembly, manufacturing, and packing.
- ② In order to be equipped with global logistics marketing abilities and efficient transportation system, a comprehensive logistic center and advanced port cargo management system will be established.
- 3 Construction of a high value added high-tech industrial complexes:
- The first industrial complex will be constructed in the area of 300,000 pyong (972,000 m²) until 2010. It will focus on auto related manufacturing and new material related industries.
- The second industrial complex will be constructed in the area of 300,000 pyong (972,000m²). The first phase of 30,000 pyong (97,200m²) will be developed until 2005, and rest of 270,000 pyong (963,000m²) will be constructed later on. This area will host ship building industry.
- The third industrial district will be a nationally designated industrial estate, which will host various activities such as R&D, logistics, manufacturing, housing, and a free-trade zone.

Youngilman Harbor's supporting area is to be developed as one of the major strategies to activate Youngilman Harbor and to help Pohang to be developed as a high-tech science and industrial city (Koo, 2005). Traditionally, the sea-port was the place for importing and exporting as a connection point between land and ocean, but now it is changing as an advanced multi-functional port which can provide comprehensive logistic services as a global teleport and high-tech logistic center. According to its long term plan, Youngilman Harbor has to be developed step by step, establish sea cargo business and marketing networks, provide efficient port operation and services, and develop teleport facilities, logistic center, free trade zone, and high-tech industrial district successfully.

For a successful development of the supporting area, the following factors has to be referred and integrated harmoniously: city infrastructures and

industries of Pohang, long term development plans of Pohang, direction of development of industrial and logistic facilities in Daegu-Gyeongbuk Province. The following factors must be incorporated to attract foreign firms: reduced tax for the incoming foreign investments, support for land development and building permit acquisitions, establishment of legal and institutional background for free trade zone, and provision of good living environments.

Compared with Busan Harbor, Youngilman Harbor has a shorter distance from Daegu and Gumi, where a large amount of cargos are imported and exported. We hope that Youngilman Harbor can perform excellent roles as a cooperative regional port in cooperation with Busan Harbor. The success of Youngilman Harbor depends on how much it can attract cargos from Daegu and Gumi areas.

There are still some negative opinions on the performance of Youngilman Harbor. There have been lack of rationale and detailed blueprint for the development of Youngilman Harbor and its supporting area yet. From now on, Pohang has to prepare for intense analyses and detailed plans, and persuade central government for supports.

4. Discussions: Problems and Solutions

4.1 Critical Questions

- ① Pohang, currently has a population of 510,000, but hopes for an increase in population to 700,000 800,000 in 2012. However, in light of the current population increase rates of Pohang and the country, such ambition is not realistic. Such non-realistic assumption will produce great inefficiencies and waste of resources.
- ② With POSCO, Pohang has been a representative steel industrial city in Korea, but nowadays Pohang is challenged by Dangjin, Chungnam in terms of hosting steel industries. More seriously, Pohang's steel industry is strongly challenged by Chinese steel products. Thus, it is said that the future of Pohang is not very bright. As Pittsburgh and Kitakyushu did, Pohang's steel industry will be faded, and economic hardship is expected.
- 3 Pohang has high quality R&D with POSTECH, RIST, and Accelerator

- Research Laboratory, but such R&D activities are not easily commercialized and connected to local industry. The technopark also maintains very little cooperation with local industry.
- Most of Koreans think that the contribution of Pohang's steel industries has been great for the nation's economy, but local people's perception for steel industries is not very positive because of environmental contaminations. People in Pohang have requested continuously for the industries and local governments to invest more on pollution reduction facilities and environmental friendly development practices, but reality is not satisfactory.
- ⑤ There are people who argue that Youngilman Harbor is planned only by political decision rather than rational decision. They argue that it is very negative for Youngilman Harbor to be successful to attract cargos from Daegu and Gumi areas because of the national major port, Busan, located not very far from Pohang.
- ⑥ For the last 30-40 years, various national policies for balanced development have been planned and implemented, but most of the efforts failed. Even now, the capital city area and west coast tends to grow much faster and better ways than any other local areas. Especially, east coast area including Pohang does not have bright future because of very disadvantaged location and little political attention.

4.2 Answers and Solutions

① Population forecasting is one of the most important factors to forecast needs of urban infrastructure and land use. During the last 10 years, population forecasts of Pohang were not correct. And there have been some different opinions regarding on future population of Pohang. We can say that incorrect forecast seems to be resulted out because domestic and world market situations have been changed unexpectedly. Since Pohang expects that a large proportion of future growth on the development of Youngilman Harbor and its supporting area, population growth also would occur through the development. According to Park(2005), the multiplier effects of the development of four container piers would be around 5% increase of GDP and 4.3% of population (22,200 persons) of Pohang. Thus, when development of sixteen container piers are finished by 2012, population of Pohang would increase at least

100.000.

- ② Youngilman Harbor to be successful, Pohang has to provide best harbor related services, attract cargos from Daegu·Gyeongbuk province, which currently use Busan Harbor in the south, and produce own cargos through development of port industrial clusters successfully. In the long run, Pohang has to develop the Youngilman Harbor as a central port of Daegu·Gyeongbuk province, a gateway to North Korea and Russia, and a major port in the East-Sea Rim area. Even though Youngilman Harbor cannot be developed as a major hub port, Pohang has to try develop it as a major port of the regionally networked multi-central port system.
- 3 Pohang has to establish a long term development plan of Youngilman Harbor, and implement on time such policies as sea port network establishment, sea port marketing implementation, efficient and an attractive port service provision, and a port supporting area development, which will include teleport, comprehensive logistics center, free trade zone, and high tech industrial district. It is important to establish port industrial cluster, which would be established through development of port supporting area and connecting these functions to other industrial functions of Pohang for synergy. A free trade zone and a foreign enterprise industrial district have to be established in the Youngilman Harbor's supporting area. Since the talk about free trade agreement(FTA) between Korea, China, and Japan has been advanced, Pohang has to prepare for a free trade zone rapidly(Lee, 2005). Thus, related institutions and scholars have to do analysis and provide road maps for such developments. In the short run, city's port and its supporting area related department has to be expanded and their abilities have to be upgraded.
- ④ POSCO and steel industrial complexes do not show sudden drops of steel production or employment as the Yahata Steel Mill in Kitakyushu and the Mon Valley Steel Mill in Pittsburgh experienced in the 1980's. However, such symptoms, even very weakly, could be perceived in the near future. To cope with the situations, POSCO itself tries to upgrade quality and reduce production costs of steel products through developing and adopting innovative technologies. To achieve sustainability and prosperity, Pohang has to restructure its industries through diversification and technological upgrading. This means that Pohang's industries have to be developed based on competitiveness and specialization in such diverse fields as

information technology, new materials, bio-technology, engineering, and urban development. Also, such policies have to be integrated with development of Youngilman Harbor and its supporting area for synergy. Pohang has to benchmark cases of traditional steel industrial cities such as Kitakyushu and world level major port cities such as Rotterdam and Singapore.

- ⑤ Pohang must also implement the policies of regional innovation system, of which central government is stressing for balanced regional development. The regional innovation system, which is based on regional networking and specialization, seems to need more detailed specific action plans and implementation strategies in the local areas. Even the technopark policy, which has been pursued last 5–10 years, seems to have similar problems in terms of regional networking and economic multipliers. Such policies as regional innovation and technopark policies have to stress more to establish regional networks and to establish local embeddedness. As Koo(2003) argues, Pohang Technopark has to improve interplay between universities, improve local relations, increase capital assistance and incubate venture firms, and specialize on few advanced sectors. In the long run, Pohang Technopark has to grow in bigger scale, impacts on conventional industrial landscape, and plays a major role in regenerating industries in Pohang.
- 6 For reduction of environmental pollution and implementing environmentally friendly development practices, City of Pohang and local firms have to spend more efforts and financial resources on pollution reduction technologies and facilities. Also, not only the newly developing port areas, but also downtown and old industrial areas have to be redeveloped as an environmentally friendly areas with enough green spaces and waterfront parks. To be noticeable industrial city, environmental friendly development is more required as a bland for Pohang.

5. Conclusion

Pohang wants to be developed as a competitive and sustainable city in the future, overcoming internal and external difficulties in terms of technology, production costs, and environmental concerns. Following are current

directions and future recommendations for Pohang:

- ① Steel industries, POSCO as well as other steel companies, have to make all possible efforts to upgrade quality and reduce production costs of their steel products through developing and adopting innovative technologies. While Pohang has to try to restructure its industries through diversification and technological upgrading. Pohang has to fully utilize its assets of prominent R&D institutions such as POSTECH and RIST to establish knowledge-based high-tech industries.
- ② Pohang has to construct and utilize Youngilman Harbor and its supporting areas successfully. Even though some negative opinions exist, if attracting cargos from the Daegu and Gumi areas successfully with good services and convenient infrastructures, Youngilman Harbor can be successful. Through Youngilman Harbor, Pohang can initiate a role as a central city in the East-Sea Rim area.
- ③ Pohang has to improve global city or international functions in terms of economy, culture, administration, and law. Also, a free trade zone has to be established at the Youngilman Harbor's supporting area. It could be a preparation for the incoming FTA between Korea, China, and Japan. It is also a good encouragement for international exchange and cooperation, and foreign investments to Pohang.
- ④ Pohang Technopark has to be pursued with the efforts to increase the venture fund and administration fund. For regional multiplier effects of the technopark to be increased, local medium and small firms have to participate more actively to the technopark programs along with R&D institutions and large firms, stressing on the concept of innovation, specialization, networking, and industrial cluster.
- ⑤ Pohang has to learn experiences from other cities which have similar character with Pohang. Traditional steel industrial cities like Kitakyushu and Pittsburgh would provide good insights for Pohang. These cities experienced industrial transitions because of world market changes. Also, Pohang could learn from Rotterdam, Singapore and other port cities, which were successful in port operation and supporting area development. In these port cities, Pohang could learn how port clusters are formed and integrated to their existing industrial and city functions.
- © Currently, downtown area including Dongbin Inner Harbor area seems to be depreciating in terms of commercial and residential functions, while Yi

Dong and other remote areas are developing. In the near future, Youngilman Harbor area, which is located far northern part, will be developed intensively. Regardless of the new developments, old downtown area and nearby waterfront areas have to be revitalized through good city planning efforts incorporating new and old development harmoniously and the concept of placeness and locality.

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