

Regional Policies and the Implications of Restructuring in the Steel Industry¹⁾

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1. Introduction

(1) Research Necessity

Since first industrializing, Korea has maintained a growth strategy centered on export-oriented major industries, selecting and supporting manufacturing industries suited to each region and creating a basis for growth. Therefore, the structure of the main manufacturing industry in any given region has a great influence on the overall economy of that region. Past industrial policies emphasized decentralization and balanced national development to increase the self-sustainability of provincial economies through the regional distribution of industrial facilities, which led to a set of core industries and companies coming to dominate regional economies.

As a result, the stagnation of major manufacturing industries has led to the formation of a structure that is directly connected to social

issues that go beyond employment and welfare in certain regions or mere bankruptcy or management difficulties at specific companies. This can be seen in the example of the regional economic downturn that followed the closure of the General Motors plant in Gunsan in 2019. Therefore industrial policies to help regions overcome slumps in main industries based cannot be implemented in neither a timely nor rational manner due to fears of negative impacts in the region. Eventually a long-term change is made necessary to help regions reshape regional economic structures overly reliant on a single industry. In terms of industrial policy, regional SMEs should not only rely on large corporations, but seek a change in the direction of developing independent viability in the region.

(2) Research Scope

This study focuses on the steel industry, in

1 This report was compiled by referring to the section related to regional policy by choe et al. (2019), "Restructuring of Regional Infrastructure Industry and Implication of Industrial Policy".

which the necessity of restructuring is raised, while recognizing that it is more important than anything else to reduce the negative impacts of stagnation of the main regional manufacturing industry on the local economy and increase the self-sustainability of the region. Therefore, the purpose of this report is to introduce the current status of the steel industry's base regions in Korea and to devise a long-term plan to overcome the serious side effects of a transforming industrial structure on the local economy. Therefore, this study does not focus on securing the competitiveness of the Korean steel industry itself, but more on what kind of countermeasures should be prepared at the regional level in the long term to minimize the negative impact on the region when the main manufacturing industry is in decline. As a result, it makes it possible to establish and implement appropriate industrial policies in a timely manner.

In order to derive implications, we analyzed regional business and industrial policy cases, and examined what roles the central government, local governments, small and medium-sized enterprises and local communities should play, and what preparations are necessary.

2. Steel Industry City and Regional Characteristics

(1) Current Status of the Steel Industry

The Korean steel industry has passed peak demand. The growth rate of domestic demand

and production has slowed and the industry has entered a mature phase of development. The domestic steel industry has grown quantitatively based on mass demand, but in recent years, the growth of relevant industries and steel demand has fallen due to a decrease in steel input and the diversification of material demand in traditional steel demand industries such as construction, automotive, shipbuilding and machinery. A qualitative change in the nature of demand is happening, where the correlation between changes gradually declines. This change in the demand structure has been experienced by advanced countries, including those in Europe, as well as the United States and Japan.

In terms of technological competitiveness, the technological advantage held by Korea and the most advanced countries in the metal materials industry remains, but the gap with China, which can be said to be a rival country, is gradually narrowing. In response to this, research and development on promising items expected to increase in demand are actively progressing, but mainly at large companies. In other words, the vulnerability of the industrial structure, where the imbalance between the upstream and downstream sectors is severe, is an obstacle to future industrial development.

As of 2017, the major steel regions in Korea are Gyeongbuk, Jeonnam, and Chungnam, where the integrated steelworks of POSCO and Hyundai Steel are located. The regional supply structure is one in which semi-finished products are produced in Gyeongbuk, Jeonnam, and

Chungnam, where demand industries are concentrated, then supplied to densely-populated metropolitan areas to produce various processed products that meet local demand.

The steel industry is also concentrated in regions where large enterprises are located due to an industrial structure that is highly dependent on a small number of large enterprises in the commercial process. Therefore, as industrial reform is carried out predominantly in large corporations, the impact on the steel belt will also be significant. Therefore, it is necessary to look at cases of major overseas regions that have already undergone restructuring in the steel industry and strengthen the competitiveness of regional SMEs. These firms can protect the regional economy from exogenous influences but are highly dependent on large corporations and regional policies. Thus such policy instruments also need to be examined in detail.

(2) Regional Characteristics

1) Pohang Area

In the steel industry in the greater Pohang region, mid-sized companies and small and medium-sized companies form the industrial base, revolving around one large company: POSCO. Pohang also has regional R&D institutions related to steel, including the Pohang University of Science and Technology (POSTECH), the Pohang Research Institute of Industrial Science and Technology (RIST), the Korea Institute of

Robotics and Technology Convergence (KIRO) and other universities and research institutes such as the Pohang Techno Park and the Pohang Institute of Metal Industry Advancement (POMIA). The region is home to a robust R&D infrastructure and an excellent research workforce. The transportation infrastructure for regional cooperation comprises expressways (Pohang-Gyeongju-Ulsan), high-speed trains (KTX) and a regional airline (Air Pohang). The foundation of the steel industry is in Pohang proper, including the Blue Valley National Industrial Complex, the Yeongil Bay Port Hinterland and new industrial clusters such as the Free Economic Zone.

In the Pohang region, manufacturing accounts for more than 50 percent of the regional economy, and more than 90 of the manufacturing sector is dominated by steel-related industry. In addition, companies that can be called primary vendors that have direct business relationships with POSCO group companies take the form of outsourcing partners. In addition, these companies cannot but be directly affected by changes in the management conditions surrounding POSCO, so POSCO's management activities have a great influence on the economy of the Pohang region.

Organic cooperation between regional R&D institutions in the Pohang region is lacking, R&D levels at firms is insufficient, and the link between R&D performance and the creation of business models is insufficient. In addition, there is a shortage of jobs amid brain drain and

a shrinking population. There is a limit to the creation of added value as the industrial structure cannot be diversified due to the absence of a start-up culture centered on manufacturing-based industries.

It is very important to improve the competitiveness of the Pohang steel industry in order to secure a recovery or sustained growth in the economy of the greater Pohang region. In order to improve competitiveness, it is necessary to diversify the industrial structure and create new markets, to promote win-win cooperation between large companies and SMEs, and to enhance technological innovation through the formation of organic cooperative relationships with local R&D institutions.

2) Gwangyang (Jeonnam) Area

Gwangyang City has strength in the steel industry as it is home to a world-class steel company, Gwangyang Steel Works, as well as and related industries and a complete port logistics infrastructure. In other words, Gwangyang City is located at the center of Northeast Asia shipping and logistics, in a geographically advantageous location and with a free economic zone in the Gwangyang Bay area hosting a business-friendly environment with industrial infrastructure, a lax regulatory regime and various support policies. Gwangyang City is home to the world's largest single-scale POSCO steelworks, the Gwangyang Works complex, as well as the Yeosu Petrochemical Complex, a

rear industrial complex. The steel industry in Gwangyang City is specialized in mass production of small items and automotive steel (hot rolled and cold rolled coils, thick plates, plated steel sheets for automobiles, and others). Only a few companies manage the processing of hot-rolled and electric furnace crude steel produced at the Gwangyang Works.

However, the steel industry is unlikely to recover to its previous highs in the short term due to the downturn in the shipbuilding industry, which is a heavy plate demand industry, as well as competition with China and the recent rise of protectionism in the US. Gwangyang Steelworks' output features a high proportion of zinc steel sheets for automobiles, plated steel sheets for electronic products and heavy plates for shipbuilding, which is greatly affected by the downturn in the automobile and shipbuilding industries. In addition, the customized labor training system in high demand in the region is insufficient, and the capacity to support start-ups is insufficient.

3) Dangjin Area

When comparing Pohang and Dangjin, which are major domestic steel industry clusters, Dangjin is only half the size of Pohang. The number of businesses in Dangjin is less than half of that of Pohang, but the number of workers is about 60 percent, indicating that it is home to many large companies with a large number of workers. The number of employees

per business entity was 117.8 in Dangjin, higher than the 83.8 figure in Pohang.² In Pohang, there are a number of small and medium-sized enterprises (SMEs) that are related to the steel giant POSCO, whereas large companies are concentrated in Dangjin while related firms are concentrated in nearby Cheonan and Asan.

In Pohang City, POSCO is the center of the steel industry ecosystem, and as a steel city, local governments and POSCO are connected with each other. As Hyundai Steel is located in Chungnam, it is necessary to establish a Chungnam-style steel ecosystem benchmarking the POSCO model. POSCO started out as a state-owned company and became privatized in 2000. However, as it has the image and status of a national company, cooperation with local governments and win-win cooperation with small and medium-sized business partners are naturally being promoted.

3. Policy Directions

Although regional industrial policies are being promoted in various forms, the effect of policies that the local residents actually experience is still insufficient. This is because the promotion of local industries has shifted to R&D since the 2000s, and even though R&D investment is continuously expanding, there is little effect on local job creation or regional competitiveness.

Even if the local industry grows in scale, it is the creation of good local jobs that ultimately affects the region most directly. According to Lee (2019)³, 31 of the 39 regions with the highest job quality, close to 80 percent, are distributed in metropolitan areas. A quality index (the higher the number, the better) indicates high-quality jobs in Seoul (1.928) and Daejeon (1.482) with lower-quality work in Jeonnam (-1.663), Gyeongbuk (-1.117), Chungnam (-0.733), and Gyeongnam (-0.550).

Regional industrial policy has historically includes regional and industrial policies. The main purpose of doing so was to resolve the imbalance among regions up to 1997. Since then, industrial policies have focused on the establishment of a regional innovation system and endogenous regional development (1998-2002), balanced national development to secure a foundation for independent growth (2003-2007) and securing regional global competitiveness (2008-2012).

As stated in the introduction, the purpose of this report is not to suggest a development plan for the steel industry itself, but to derive implications for the region based on the steel industry to minimize side effects caused by the transformation of the infrastructure industry and to engender self-sustainability. This will be described through divisions into the following: 1) strengthening the self-sustainability of local

2 National Statistical Office (2018), "National Business Survey as of 2017".

3 Sang-Ho Lee (2019), "Local Job Quality and Social Economic Inequality", The Korea Employment Information Service.

SMEs and 2) the role of the government and strengthening the policy capacity of local governments.

(1) Strengthening the Self-sustainability of Local SMEs

In order for local economies and industries to grow together, it is first necessary to strengthen the self-sustainability of local SMEs. When a region has an industrial structure concentrated in a specific industry, the impact on the regional economy is widespread when economic fluctuations or structural changes in the industry occur at home or abroad. When a crisis occurs in the regional flagship manufacturing industry, sales of related SMEs in the region decline first and delays in payment of delivery costs may occur, leading to bankruptcy or closure of related companies due to the SMEs' funding crunch and cost-cutting. In addition, if investment in production facilities is not made in a timely manner, industrial competitiveness decreases and this affects related industries.

Even if a company does not go bankrupt or go out of business, difficulties in funding and obtaining financing may destabilize employment conditions. Such anxiety over employment or unemployment also lowers the quality of life of workers and accelerates the outflow of industrial labor, weakening the labor pool of the local industry. In addition, unemployment brain drain out of the country can also lead to recession in regional service industries such as

food and lodging, distribution, and education services, which are the main pillars of the regional economy, and the overall regional economy suffers. Therefore, it is difficult to reduce the impact of external shocks even if industrial policies or other policy measures are implemented in these areas.

Although the steel industry is struggling due to the economic downturn in the downstream sector, SMEs that maintain stable operating conditions despite these difficulties are those that have somehow developed their own innovation capabilities. The current regional problems are side effects of SMEs without native innovation capabilities being too dependent on large companies to survive during restructuring periods. Such firms either go bankrupt or seek out government support. But those firms are first and foremost responsible for themselves, so their large business partners need to establish a policy system that induces small and medium-sized businesses to develop long-term innovation capabilities. Thus government support should go to companies that are either equipped with innovation capabilities or those that have made practical efforts develop them.

Unlike other industries, the materials industry cannot produce results in a short period of time. Many SMEs have become so accustomed to subcontracting relationships with large companies that their entrepreneurial spirit has withered. Companies continue to leave only one factory in its original place but relocate to where the final demand is. Therefore, it is nec-

essary to institute a drastic restructuring of the government support for research equipment that can be utilized at SMEs and a system for developing and launching prototypes in the materials market must be established.

In developed countries, the steel industry has become a low-end industry, but countries such as Japan, Germany, and Sweden, which still have strengths in the steel industry, have succeeded in converting to high value-added industries based on small-scale production of multiple varieties. Korean steelmakers can survive in the market only if the steel industry is converted into a high value-added industry. Considering the fact that the cooperation of SMEs has greatly supported the growth of large corporations, it is essential to create a healthy industrial ecosystem to improve future industrial competitiveness, and for this, it is necessary to establish conditions in which SMEs can coexist with large corporations.

(2) The Role of the Central Government and Local Governments

Local governments and regional industry promotion agencies need to prepare strategies for creating jobs in connection with local industries, enable local companies to transform the structure of technological development and production and participate in structural transformation beyond regional interests. It is also necessary to draw in companies to which regional governments are well suited, attract for-

eign capital and expand regional value chains and devise a plan to ensure competitive firms remain in the regional industrial ecosystem. In other words, local governments, regional industry promotion agencies, and regional planning agencies should play a major role in creating local jobs through the development of local industries, ensuring the stability of the labor pool and income. However, in performing these roles and implementing regionally-tailored policy, the relevant authorities must be aware of the current status of each steel-producing region. What follows is an analysis of the current situation of the region the implications for policy thus carried.

Steel complexes in the Pohang area are largely divided into national industrial complexes and regional industrial complexes (specifically, the Youngil Bay and Gwangmyeong Industrial Complexes). POSCO resides in a national industrial complex. The Blue Valley Industrial Complex is not yet operational. Local SMEs are located principally in regional industrial complexes the Youngil Bay and Gwangmyeong Industrial Complexes. When the steel industry was booming, a typical POSCO subcontractors received raw materials from POSCO (for example, coil centers). These SMEs can be broadly divided into companies that work entirely within POSCO and those who operate their own factories and receive POSCO orders.

The Pohang Steel Cluster has not yet been forged into a true industrial cluster in which companies from the front and rear industries

in the steel sector are agglomerated. Structural problems of the Pohang Steel Cluster include 1) corporate aggregation focused on primary metals, 2) a high dependence on POSCO, 3) excessive numbers of spinoffs, which have a weak linkage effect, 4) intensifying domestic and international competition and 5) increased costs and reduced steel demand.

POSCO meanwhile did not enhance its competitiveness through M&A, but rather through quantitative expansion of size and sales, as it became a steel material production base at the national level. POSCO is capable of supplying most of what it needs in-house, but high-ranking POSCO ex-leaders have founded outsourcing firms that partner with POSCO in a supply role. These firms are not affiliates but technically separate entities from POSCO. However in reality they play a role as a de facto executive agency

Emerging countries such as China and India are growing rapidly, and competition at home and abroad is expected to intensify due to competing cities such as Gwangyang and Dangjin. The decline in demand for steel products is likely to accelerate due to the cost burden caused by rising international raw material prices and structural changes in the automobile and shipbuilding sectors. Unlike Pohang, Gunsan had an industrial ecosystem before the closure of the GM plant. Pohang should diversify into high value added industries such as metal processing to vitalize its industrial ecosystem.

The biggest problem with Pohang's regional industry is that it relies too much on POSCO

and that a desirable industrial ecosystem has not been achieved. Small and medium-sized steel makers in Pohang are subordinate to POSCO, so there is no incentive for restructuring, and thus their self-sustainability (self-innovation ability) is poor. In Germany, small and medium-sized companies that produce pots and knives also produce excellent products and export them to the world market.

In Incheon and Busan, it is possible to process molds, but in Pohang (not a problem of scale), the entire process from molds and injection to finished iron products is not done unless it is the final products are at least as big as steel pipes. Therefore, even if SMEs have an idea for a product, there is no foundation for creating and producing prototypes.

For the future, companies that voluntarily seek and invest in new business items need to find their own self-response, and a support policy that enables them to produce until final goods through infrastructure reconstruction and technology certification is needed. Due to the rapid speed of technological development, research equipment is less efficient than production equipment, so the risk is too great for SMEs to take on the risk. The conditions for joint R&D of SMEs should be made holistically.

At present, it may be difficult to implement responsible local policies due to a lack of planning ability, but it is necessary to continue attempting to implement local goods decisions independently, even within an upper bound, by enhancing the autonomy of local governments.

Only through such a process can capacity be gradually developed in the region.

Unlike the Dangjin Industrial Complex, companies in the Yulchon Industrial Complex in Gwangyang and Suncheon in the province of Jeollanamdo rely mainly on POSCO and this has not significantly changed over time. POSCO produces and processes automotive materials that require core technologies, while SMEs operating other facilities and plants produce general purpose products in the Yulchon Industrial Complex. Among them, SeAH Steel, a midsized company sells hot-rolled steel sheets through seamless welding.

There is little change in the entry and exit of companies in the steel industry in this region, and the recent US steel-related trade policy has hit them hard. But companies with a high proportion of exports (especially in Iran) such as SeAH Steel have been hit even harder. In the case of general SMEs, in order to convert or upgrade the industry, it is almost impossible to change the industry even while taking significant risks because of excessive initial facility investment costs due to the capital-intensive nature of the steel industry.

In the industrial ecosystem, market diversification is difficult due to the practice of productivity-oriented, closed-loop information sharing through vertical integration, which is characteristic of large corporations. This constitutes a hard limit on the effectiveness of preparations for the fourth industrial revolution. Regional efforts must be made to create an open ecosystem

with small and medium-sized enterprises (SMEs) in order to change the closed system of large corporations' local production facilities into an open and dynamic system centered on small and medium-sized enterprises, and to achieve global competitiveness through this.

Local industrial policy is desirable only when local governments have the right to do business, but there is one thorny issue at hand: only the central government has authority for both "business" and "budget". Since it is difficult for the central government to consider regional characteristics budgeting, a bottom-up method that adjusts for comprehensive recruitment from local governments may be desirable. Since most representative SMEs in Jeonnam and Gwangyang have worked with large companies, there will be real difficulties in uniting regional voices for creating an ecosystem centered on SMEs in Gwangyang. Therefore, the role of local governments or regional policy planning organizations is more important. When it comes to regional industrial policy, cities have geographically integrated infrastructure, so it is possible to use and control networks (for example, clusters). But the surrounding urban and sub-urban areas around cities are not as integrated. Therefore, the necessity of a decentralized industrial policy must be considered.

Small and medium-sized enterprises in Gwangyang, Jeollanam-do are having difficulty in performing R&D and diversifying their businesses because they cannot afford to reinvest. A plan should be devised so that local SMEs can

escape from the pressure of exclusive contracts from large companies by participating in the global network. In terms of industrial portfolio, it is necessary to consider how to diversify the existing flagship industries at the level of local governments, but it is difficult to say that it is practically helpful to SMEs. This is because there are not many small and medium-sized enterprises that can afford to make considerable investments in facilities. Therefore, the subject of concern should be a company, and if companies discover and propose a new business, the local government or the central government should support them to make it.

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