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Multi-scalar Dynamics of Cluster Development: The Role of Policies in Three Korean Clusters

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Abstract

This paper critically examines cluster dynamics and development in a multi-scalar approach, criticizing both the argument overemphasizing local networks and endogenous development for regional development and the contention highlighting global networks and the role of global players. We argue that state policies, exogenous and direct, play a significant part in cluster dynamics and development especially in the case of Korea where the state government's strong policies have led to rapid industrialization. We analyze multi-scalar factors, especially the government policies at a national level, in the development paths of the three cases including Ulsan automobile cluster, Daedeok research cluster, and Dongdaemun fashion cluster.

Keywords: cluster theory, multi-scalar geography, Korea

Introduction

The rise of successful industrial clusters, such as Silicon Valley, in knowledge-based economies has received the attention of many scholars and policy-makers since the 1980s. They have recognized the role regions play in innovation and economic development. A large number of academic arguments on innovative clusters and policies to promote successful clusters have emphasized interactions between local innovators and regional institutions (e.g., Saxenian 1994).

However, their exclusive focus on local networks and endogenous development has been criticized for not taking into account non-local networks and other exogenous factors affecting cluster dynamics (Bathelt et al. 2004). According to the critics, innovation networks and knowledge flows are not confined to the local level but involve global linkages. Both sides of the argument, however, overlook the significant role of exogenous government policies and multi-scalar factors affecting cluster dynamics and development (Sohn et al. 2009).

The Korean clusters are examples that show the importance of government policies at a national level in cluster dynamics and development. Korea has been referred to as a successful model of a developmental state where government policies combined with dominant large firms have led to rapid industrialization and economic growth. Many of the Korean clusters have been created by strong national government intervention; the legacy of the developmental state model is imprinted on their development path. However, recently criticism has grown and the limits of government policies' effect on clusters are often pointed out (Lee et al. 2006).

Considering the gap between the above arguments and the reality of the Korean clusters, we seek to answer the following research questions. What drove the generation

and development of Korean clusters? Have they been influenced by multi-scalar factors on the local, national, and global scales? And have the government policies of Korea, where the state has led industrialization, played an important role in cluster dynamics and development? If the government's policies played a key role, are they still effective in promoting cluster innovation?

In order to answer the above questions, we will examine the dynamics of three Korean industrial clusters in a multi-scalar framework, focusing on the role of government policies. The next section will critically review theoretical arguments about cluster dynamics on various scales and the role of policies in cluster development and will translate the arguments into the Korean context. Based on this, we will investigate the spatial dynamics of three Korean clusters and the role of policies in cluster generation and development.

Cluster Dynamics and Development as a Multi-scalar Process

In recent years, studies on innovative clusters and policies to promote successful clusters have abounded in academic and policy circles. A cluster is defined as a localized industry configuration where interrelated firms concentrate within a local boundary. The concept emphasizes internal relations between local firms and the importance of 'traded and untraded interdependencies' (Storper 1997) for supporting the concentration (Depner and Bathelt 2005, Asheim and Gertler 2005). The related studies have focused on interactions between local innovators and regional institutions - these interactions foster self-sustaining endogenous development - largely in the Western context (e.g., Saxenian 1994).

However, criticism has arisen that these studies exclusively focus on local networks and endogenous development, while neglecting non-local networks and other exogenous factors affecting cluster dynamics (Bathelt et al. 2004). The concept of 'global commodity chains' emphasizes the advantages of international production organizations and governance structures for regional economic success (Gereffi et al. 2005). Proponents emphasize the role of trans-local actors, especially external global firms and their networks with local actors for regional upgrading. The 'global production networks' thesis argues that strategic coupling between global production networks and local institutional thickness, mediated by diverse institutional forces, is key for regional economic development (Yeung 2009).

Both sides of the arguments often overlook the significance of the national level or recognize it as a secondary and indirect factor for cluster dynamics and development. The national level is important in determining the configuration of the regional production system and cluster development (Bathelt 2003). Distinctive regional institutional endowment is associated with particular regimes of business systems and institutional frameworks at a national level (Asheim and Gertler 2005).

Accordingly, the authors believe that the dynamics of a cluster can be better understood as a multi-scalar process.¹ The production linkages and innovation networks of a cluster are often extended to the national and global division of labour. Communities of practices also cross-interregional and even international boundaries. And exogenous actors and relationships play a larger role at a national and global level (Asheim and Gertler 2005). The spatial multiplicity of clusters, however, is not a static

¹ The multi-scalar approach in geography has recently received attention since it provides a tool for grasping the global, national, and regional economic and social dimensions of economic globalization (Park 2009). It adopts the relative notion of scales in contrast to the conventional view, which regards scales as being separate and distinct.

or uniform phenomenon (Lee 2008). Each cluster has its stages of rise, growth, decline, and rejuvenation, which are influenced by specific multi-scalar factors (Maskell and Malmberg 2007).

Among the multi-scalar factors affecting cluster dynamics and development, we argue that state policies, exogenous and direct, should be taken into particular account. The role of state policies in cluster dynamics and development has often been underestimated, particularly in Western contexts. Bresnahan et al. (2001) argue that state policies have not had a substantial influence on the establishment of clusters, including both advanced and emerging regions; their study focused mostly on Western countries. Instead, their work underscores the degree of openness in regional economic relations and connections with large external markets in order for clusters to be successful. However, state policies have played a significant part in regional economic development, particularly in East Asian countries (Yeung 2009).

Clusters in Korea: The Role of Government Policy

Korea is often referred to as a successful model of a developmental state, which is characterized by a strong central government that deliberately and strategically supports large enterprises and industrial competitiveness. The influence of the national level has dominated the local and global dimensions of most industrial cluster dynamics in Korea (Lee 2008). Government policies have directly supported the generation of industrial agglomerations in a number of regions. Dynamics and development of such regions are largely directed from outside and above the region; for the most part, innovation occurs as a product of government policies (Cooke et al. 2007).

The history of Korean policies on industrial clusters goes back to the 1960s. The government sought export-oriented industrialization and supported particular sectors and locations. Labour-intensive industries were the major industries in the 1960s; heavy and chemical industries were strategically promoted in the late 1970s and early 1980s. The Korean government established several large industrial complexes in the southeastern part of the country, including Ulsan, Changwon, Gumi, and Pohang, which later developed into industrial clusters. However, the industrial complexes in the early stage of development lacked significant local production networks, with only limited linkages between large firms and their suppliers (Park 2009).

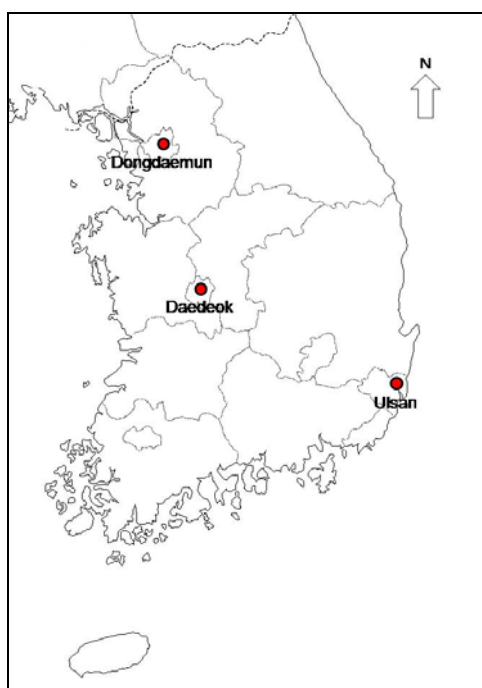
Korea created numerous government institutes to undertake research and development (R&D) activities, which triggered a sharp increase in industrial R&D investment in the 1980s. It also established the Daedok Research Park, where many government research institutes are located. Since the mid-1980s, the focus of government policies has moved to high-technology industries. Since the late 1990s, the Korean government has increasingly favoured knowledge-intensive industries. The policies supporting high-technology and knowledge-intensive industries resulted in a concentration of those industries in the capital region (Park 2009).

The term 'cluster' recently received a lot of attention in Korea and became one of the key words in the government's 'new regional policy' for balanced development between 2003 and 2008. The policy was pursued to enhance endogenous growth potential of regions and national competitiveness by promoting innovative clusters. The Korean government's industrial policy in that period consisted of two parts: an innovative cluster policy and a regional strategic industry promotion policy. The first one was intended to transform existing industrial complexes into innovative clusters.

Each was specialized in a particular industry², and networking among local firms was underscored. Daedeok Science Town was designated as a special district and promoted as a research cluster. Second, a couple of strategic industries were specified in every province and metropolitan city of Korea, and policy supports were provided through infrastructure building, R&D support, human resource development, and networking support among industries, universities, and research centres. Building regional innovation systems in the provinces and cities, especially in the non-capital regions, was a goal of the new regional policy. The policies were initiated by the central government; however, local governments have been increasing their role in developing clusters in their regions (Lee et al. 2006, Park 2009). Overall, policies on developing clusters and regional innovation systems resulted in the building of infrastructure for innovation in each region and connecting industries with local universities. However, it remains to be seen how the government's policies on cluster development will contribute to upgrading industrial clusters into innovative clusters.

We selected three Korean clusters as illustrative case studies - Ulsan automobile cluster, Daedeok research cluster, and Dongdaemun fashion cluster - to investigate cluster dynamics and development in a multi-scalar framework and to analyze the role of government policies in the process (Figure 1). The three cases were selected based on the characteristics of major local innovators and the role of government policies in the initial stage of cluster development. In their early stage, these clusters had limited local linkages and lacked innovative activities. Each cluster experienced challenges and opportunities and recently recognized the need to upgrade to an innovative cluster. We examine development of each cluster in three stages: early and development stage, transformational stage, and upgrading stage.

Figure 1: Locations of three clusters in Korea



² This includes the IT cluster in Gumi, the automobile cluster in Ulsan, the machinery cluster in Changwon, the parts and component cluster in Banwol-Sihwa, the parts and components of automobile and machinery industries in Gunsan-Janghang, the photonics industry in Gwangju, and the medical instrument industry in Osong.

Ulsan Automobile Cluster

Ulsan is one of the largest automobile cluster, which has 193 companies, including Hyundai Motors, and whose production volume is about US\$25 billion (as of January 2007).³

Early and Development Stage

The early growth of Ulsan was the result of Korean national government policies coupled with the presence of a large company. Since the 1960s, Ulsan has grown to be one of the major centres of Korean auto manufacturing, petroleum refining, and shipbuilding. Ulsan has experienced accelerated growth as a result of having been designated one of the 'Special Manufacturing Districts' in the Korean government's 1962 Economic Development Plan. Ulsan has been the hometown of Hyundai Motors since 1969. As Hyundai expanded its car production, its suppliers began to locate facilities in Ulsan. In the early stage, local production linkages were formed between suppliers and Hyundai, and some of the employees of Hyundai later established their own auto parts companies. However, most of the suppliers lacked design capabilities.

As Hyundai has grown in the domestic market and expanded into the global market, interactions between Hyundai and its local suppliers have strengthened and strong engineer networks have developed among them. Despite this, Ulsan is still dominated by Hyundai and collaborative networks between local suppliers did not develop.

Transformational Stage

The Ulsan production system has recently confronted challenges in relation to the national and global level. Hyundai's relocation of its R&D centre to the capital region in 2005 caused the weakening of the link between R&D and production. Hyundai also invested in establishing production lines and R&D centres in foreign countries, and some of its second- and third-tier suppliers moved their production facilities to other developing countries with lower wages.

Since the 1990s, several leading suppliers in Ulsan have enhanced their own capacity of production and process innovation. However, some have charged that the power structure between Hyundai and its suppliers has created bottlenecks, preventing the smooth transition to an open and continuous experimentation of locally embedded horizontal networks, essential to innovative activities.

Upgrading Stage

In order for the Ulsan cluster to take off as an innovative cluster, suppliers need to develop their own R&D capabilities in order to create stronger innovative networks between Hyundai and its suppliers. While a small number of suppliers have developed their own innovation capabilities, a majority of them are still dependent on Hyundai and accustomed to subcontracting based on vertical networks. This results in low intention on the part of suppliers to create their own technological innovation through R&D activities. Developing collective production networks would help the first- and second-tier suppliers to produce quality products to sell in the global market.

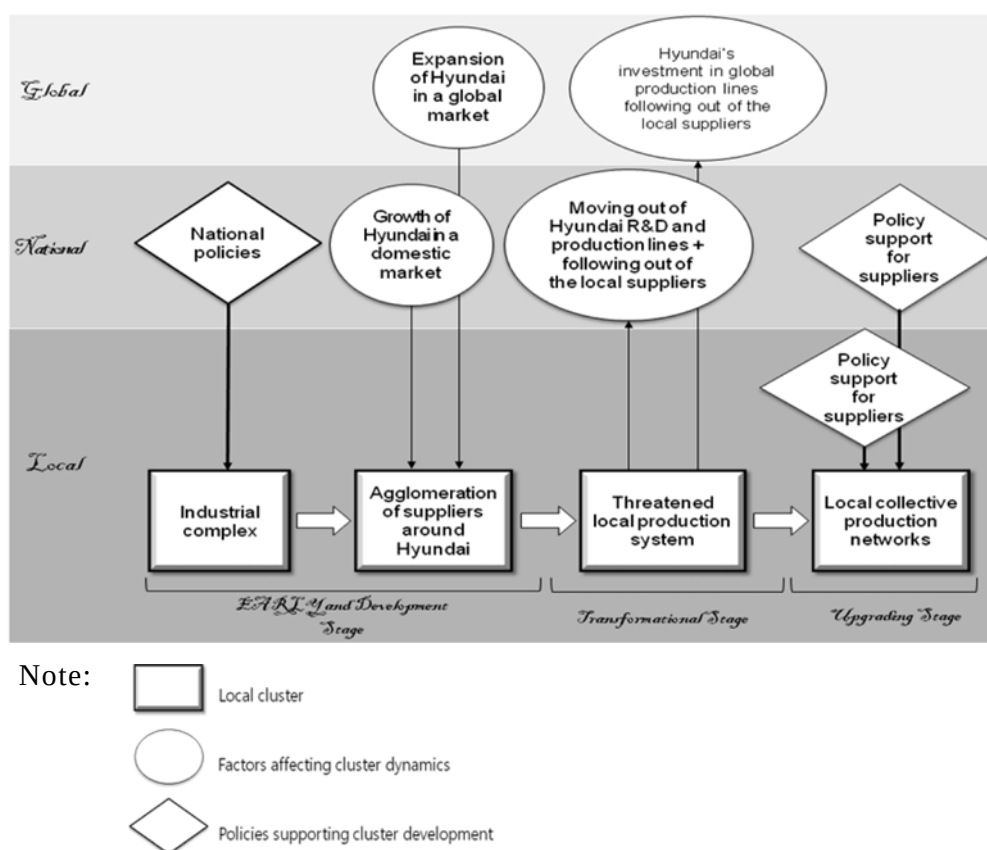
Recent government policies, not only at the national level but also at the local level, have supported upgrading the Ulsan automobile cluster to a centre for global sourcing. They have especially targeted developing suppliers' technological capabilities.

³ <http://english.ulsan.go.kr/indexEn.php>

There have been two recent projects supporting the Ulsan automobile industry: first, the Auto Valley Project by the City of Ulsan; and second, the Innovative Cluster Project by the Korea Industrial Complex Corporation (KICOX). The Auto Valley Project aims to help suppliers in Ulsan develop technological competitiveness and participate in global parts sourcing. The City of Ulsan established the Automotive Parts Innovation Centre and has been supporting suppliers by providing services including marketing, exports, and networking. KICOX, one of the agencies of the central government that previously focused on management of infrastructure, has been supporting inter-firm networking and technology development.

Recent government policies have motivated local suppliers to develop their own technological capabilities and to invest in R&D. However, the policies' focus on suppliers resulted in the exclusion of Hyundai, which is still the most significant customer and source of information and knowledge for its suppliers. In order to upgrade Ulsan to an innovative cluster, regional innovation capacity should be enhanced by developing local collective production networks, including not only Hyundai and its suppliers but also local universities and research institutes.

Figure 2. Ulsan automobile cluster



Daedeok Research Cluster

Daedeok is a research cluster located in the city of Daejeon, which has 977 organizations, including 73 government research institutes, six universities, and 898 companies. It has 40,338 employees, including 6,800 Ph.D. students, as of 2007.⁴

⁴ <http://www.ddinnopolis.or.kr/>

Early and Development Stage

In its early stage, Daedeok⁵ was just a place where a number of government research institutes were collocated. It lacked local interactions and knowledge exchanges. Each research institute largely depended on its own research funds provided from ministries of the central government and developed technologies for its designated industry. It had little reason to interact with the other institutes in the area.

The financial crisis of the late 1990s at the global level and government policies at the national level brought changes to Daedeok. Facing International Monetary Fund (IMF) conditions as a result of the crisis, spin-offs were established by scientists and engineers previously employed at the research institutes in Daedeok. At the same time, the Korean government began to promote commercialization of results from government research institutes in the 1990s. The spin-offs were supported by government policies intended to promote venture firms. These venture firms, mostly R&D-oriented, developed diverse technology networks with research institutes in Daedeok.

Transformational Stage

Daedeok has been losing some of its most successful venture firms. They grew from the start-up stage and listed on the KOSDAQ (Korean Securities Dealers Automated Quotations) exchange. Many have relocated to the capital region to get easier access to various production facilities and services, including marketing. As a result, technology networks between research institutes and venture companies in Daedeok have been weakened. The central government has tried to support venture firms by providing production facilities and services in Daedeok, where research and education functions were previously dominant. However, the policy support could not stem the exodus of successful venture firms from Daedeok to the capital region.

Upgrading Stage

To provide a basis for venture firms to grow in Daedeok, the key is linking local venture firms, mostly R&D-oriented, to national and/or global producers of finished goods and services. Coordinating technological assets of local firms will increase the value and possibilities of national and/or global marketing. Through policy support for global marketing and networking, venture firms could develop an innovative cluster, which could promote the firms' technologies in the global market.

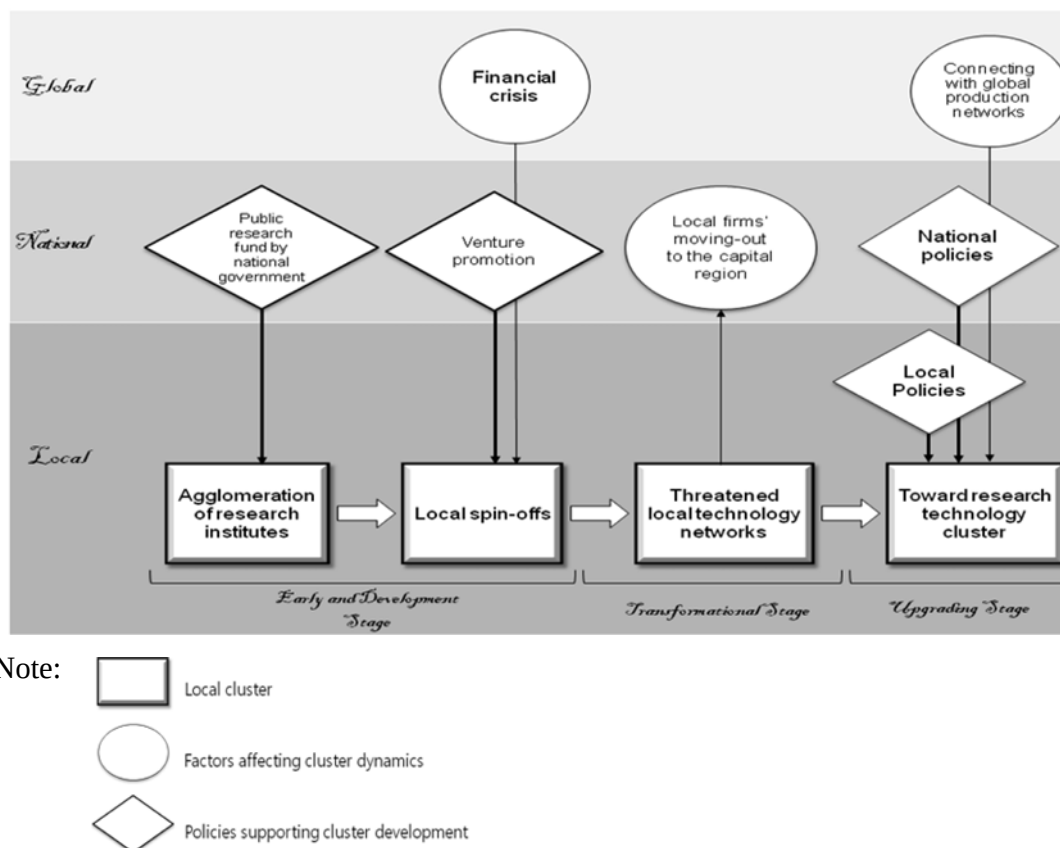
Since 2000, the central government has started to support the transformation of Daedeok as an innovative cluster; the local government in Daejeon also participated in the support. 'Daedeok Innopolis' was established to combine research, education, and production functions; the cluster was strengthened by a special law.

The recent policy supports for Daedeok have taken two tracks. At the national level, the Daedeok Innopolis and the Small and Medium Business Administration have supported venture firms in the areas of R&D and technology development, commercialization of research results, marketing, and exporting. At the local level, the City of Daejeon has also supported venture firms by investing in R&D and production facilities for local industries, providing services for marketing and promotion, and

⁵ The Daedeok Science Town was established as part of the central government's plans for science and technology (S&T) development. The government aimed to build a research park where research institutes and universities were collocated with innovative networks connecting each other. Daedeok's mission was to help domestic industries develop technologies (Ministry of Science and Technology 2008).

fostering innovative networking. Business incubators, established at a number of local research institutes and universities, are another policy support for venture firms in Daedeok. However, policies concerning commercialization and marketing, which are an acute weakness of venture firms in Daedeok, are limited to support for exhibition participation and promotional brochures.

Figure 3. Daedeok research cluster



Dongdaemun Fashion Cluster

The Dongdaemun area in Seoul is a famous garment cluster in Korea, where approximately 30,000 garment, textile, and accessories shops are concentrated.

Early and Development Stage

Dongdaemun has developed from being a historical local market for necessities into a national hub of the clothing industry in Korea. Dongdaemun has developed its unique path without being dominated by global buyers. Dongdaemun has accumulated its own assets as a centre of wholesaling and retailing to supply the Korean domestic market (Kim and Shin 2000, Shin 2005). Dongdaemun has not been supported by national policies, which have strongly promoted exports, since its products are mainly for the domestic market.

Dongdaemun has grown rapidly since the late 1960s with the booming domestic market for ready-made clothes and later casual clothes. The local production system of Dongdaemun was formed to provide garments that were sold in the wholesale market; local capacities for design and production were enhanced to produce various fashionable clothes in a short period. Dongdaemun consists of numerous small firms

that plan, design, produce, and sell clothes. Most of the products are planned and designed by the merchants, and small sewing factories are located close to Dongdaemun.⁶ The clothing makers can purchase textiles and accessories, such as buttons, zippers, labels, and wrappings, within Dongdaemun. Collocation of tightly related firms enhances access to product-related information, resulting in an efficient quick-delivery system. It takes on average one week in Dongdaemun for a new product to come to market from the design stage, while other Korean original equipment manufacturer (OEM) producers take at least one and half months to produce a new item.

Transformational Stage

The late 1990s financial crisis threatened the national economy of Korea; however, the change of the exchange rate during the crisis provided short-term price competitiveness for Dongdaemun. Foreign buyers, mostly from East Asian countries including Japan, Taiwan, and Hong Kong, found Dongdaemun an attractive supplier for low-to-mid-priced markets, where consumer demand was increasingly diversified and product cycles ever shorter. Export growth provided Dongdaemun with a new and larger market, leading to an expansion of sales and the number of firms. Thus, Dongdaemun has developed, since the late 1990s, into a place for original design manufacturers (ODMs) facing increasing exposure to foreign buyers (Lee 2003).

The short-term price advantage caused by the IMF's conditions did not last, and Dongdaemun has been facing challenges to upgrade its production system. Dongdaemun has recently stagnated as the result of movement of production facilities to China and Southeast Asian countries, and its production system has been threatened by the upsurge in the number of Chinese garment producers.

Upgrading Stage

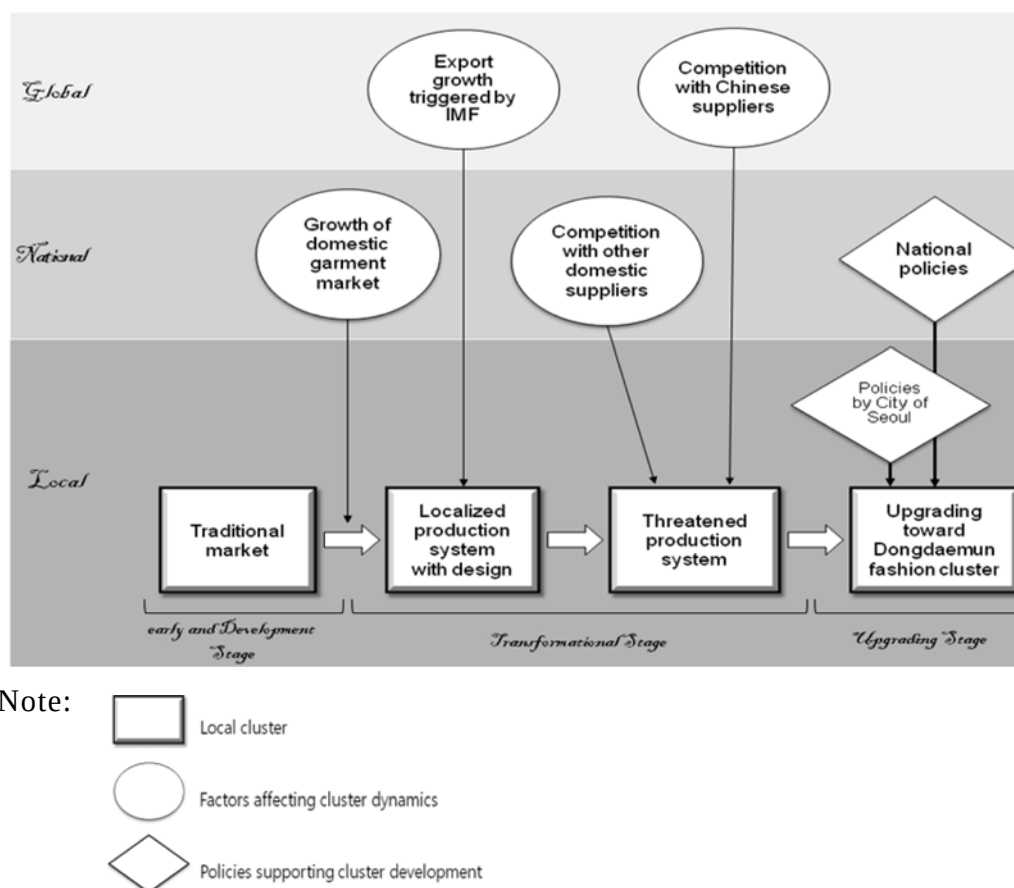
However, Dongdaemun could be a fashion hub in the casual garment market of East Asia by upgrading the sources of its competitiveness, such as design capabilities, quick delivery, and flexible small-batch production. The design capabilities have been developed as the result of sophisticated domestic demand and the recent influx of creative and entrepreneurial designers into Dongdaemun. Quick delivery of products is one of the most significant advantages of Dongdaemun, based on just-in-time production by collocated firms. Small-batch production capability is another advantage of Dongdaemun in an age of ever increasing diversification of consumer demand and shorter fashion trend cycles. To sustain and upgrade its sources of competitiveness, Dongdaemun should foster its close networks between design and production firms and upgrade the quality of the products for export to the Asian market.

Dongdaemun, a traditional market that developed without assistance from government policies, has recently been recognized as a major design centre, forming a significant part of the City of Seoul's plans to develop as a historical and cultural centre. A new Dongdaemun Design Plaza and Park is under construction where the Dongdaemun stadium used to be. The City of Seoul plans to use the building for conventions, fashion shows, and design support. Also, the Seoul Fashion Centre, located in Dongdaemun, was established by the City of Seoul and Small and Medium Business Administration in 2000 and has been supporting the fashion industry by

⁶ Most of the sewing factories are located within a 20 minute drive from Dongdaemun. They specialize in different items, such as women's wear, casual wear, children's wear, and T-shirts, depending on their location (Kim and Shin 2000).

helping to market, provide information, and educate the workforce. It is an open question whether these recent policies will rescue Dongdaemun's production system and promote its connection with the global market.

Figure 4. Dongdaemun fashion cluster



Conclusions and Discussions

This paper has examined multi-scalar factors that have affected the generation and development of Korean clusters, focusing on government policies at a national level. We have criticized the argument that overemphasizes endogenous development from local networks and the one that overstates the connection to and the significance of global players. Instead, we have argued that government policies at a national level, exogenous and direct, should be taken into account as one of the multi-scalar factors affecting cluster dynamics and development.

In the Korean case, clusters have been generated and developed by the interplay between multi-scalar factors and have been influenced by government policies throughout their development. In the early stage, government policies at a national level initiated the Ulsan automobile cluster and the Daedeok Research Park, while traditional market forces generated the Dongdaemun garment cluster. The three clusters have increasingly developed their local networks, which have provided the basis for innovation. These include strong engineer networks between Hyundai and its local suppliers at the Ulsan automobile cluster; research networks between research institutes and venture firms at the Daedeok research cluster; and production networks between merchants and sewing factories at the Dongdaemun fashion cluster. The challenges

these clusters have recently faced are interrelated with national and global economic developments: Hyundai's shift of its R&D and production facilities to other regions including foreign countries; relocation of the leading venture firms to the capital region; and relocation of the garment production facilities to China.

To overcome the challenges faced by clusters in Korea, the national and local governments have adopted diverse policies supporting the three clusters. A majority of the policies for the Ulsan automobile cluster and Daedeok research cluster have underscored networking and collaboration among local innovators. These policies are different from previous policies, which largely focused on creating the physical infrastructure for industrial complexes and science towns. These earlier policies supported large firms and research institutes without giving much attention to local innovative networks. However, they often failed to bring active participation of the key players, including leading large firms and research institutes. It remains an open question whether the clusters can continuously develop and nurture innovative networks without targeted and enlightened policy support. In case of Dongdaemun, whose strengths lie in its tightly knitted local production system, there are concerns that recent policy intervention focused on expanding physical infrastructure for the fashion and tourism industries will not have the desired effect.

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