

The Industrial Complex Cluster Program of Korea

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Since the mid-1990s, most countries in the world have adopted industrial cluster policies for increasing business competence and developing strong regional economies. Even though every country has a unique method for promoting their policies—due to economic, social, cultural and institutional conditions--it is remarkable that they have unanimously looked toward industrial cluster policies for implementing them. It implies that cluster policies have a wide range of viability: from regional development to science & technology and industry.

Korea implemented the Industrial Complex Cluster Program in 2005 in order to convert Korean industrial complexes, which are crucial to the nation's economic development, from mere production agglomerations into places of innovation, where the development of new knowledge and better value maintains its own virtuous cycle. Since its launch, the program has taken initiative in maximizing corporate growth potential through active networking among industries, universities, research institutes, and government. It has also heightened the sustainable structures of the industrial complexes themselves. This year, the program has established pan regional clusters through the expansion of target complexes throughout the nation in order to

share the outcomes of the program and to play a leading role in promoting the government's regional developmental policy, which was based on '5+2 pan regional economic zones.' By all appearances, the program has entered its growth period this year--the sixth year since its initial launch.

We take pride in the program's making unique and efficient contribution toward the growth of companies and the heightened competence of industrial complexes. The Korea Industrial Complex Corp.(KICOX) is publishing 『[The Industrial Complex Cluster Program of Korea](#)』 in collaboration with The Ministry of Knowledge Economy in order to share its outcomes of the past five years and to present a new vision for the recently restructured program.

The Korean government and KICOX will further the program, making Korean industrial complex clusters globally competitive. Hopefully, it will be not only a reference for program participants throughout Korea, but also as a tool for providing data and publicizing the outcomes of the Korean cluster program when promoting collaboration with overseas clusters.

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I . An Overview of Industrial Cluster

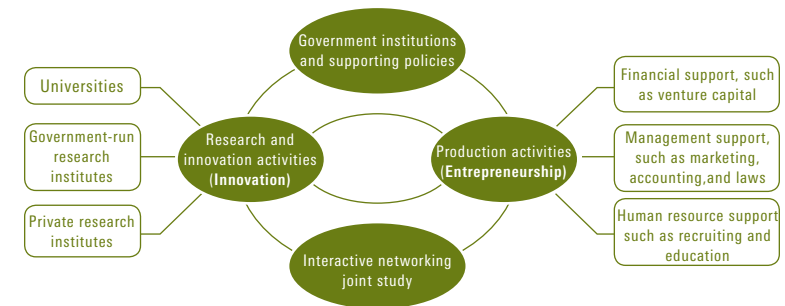
1.1 The Concept of Industrial Cluster

(1) What is an Industrial Cluster?

The word 'cluster' originates from 'a cluster of grapes' and can also refer to any group or gathering of people or things. Conceptionally, a cluster can be formed for various purposes such as making friendships, furthering education, or promoting businesses. In today's society, however, 'cluster' is used as a synonym for 'industrial cluster', as clusters typically form around enterprises and operate for reasons either business or industry-related activities.

An industrial cluster refers to a geographically proximate group of interconnected companies, universities, institutes and associated governmental institutions in a particular field, the intention of which is to create new knowledge and technology by promoting cooperation among them. It can also refer to the region itself where such interaction is taking place.

[Concept of Cluster]



(From: "Innovation Cluster," Presidential Committee on Regional Development, Feb. 2007)

The Organization for Economic Co-operation and Development(OECD) defines clusters as "networks of strongly interdependent firms, knowledge production organizations(universities, research institutes, knowledge-intensive business services), bridging institutions(brokers, consultants) and customers, linked to each other in a value-adding production chain." Meanwhile, Professor Michael Porter of Harvard Business School, who played a crucial role in spreading the discussion on clusters to the public, characterizes clusters as "geographic concentrations of interconnected companies, specialized suppliers and service providers, firms in related industries, and associated institutions(e.g. universities, standard agencies, and trade associations) in particular fields that compete but also cooperate."

As various definitions indicate, an industrial cluster is recognized not just as a production agglomeration where companies cluster due to their physical proximity, but as a network of innovative companies, universities, research institutes, and associated organizations in a particular industry that

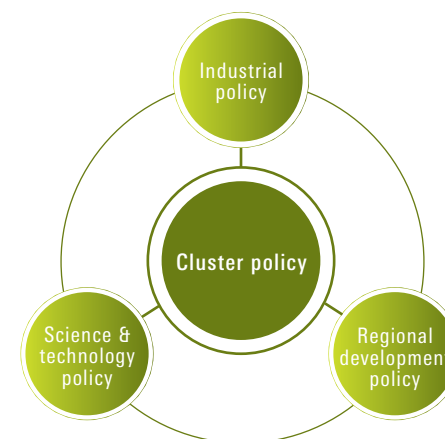
work together to increase productivity and promote innovation, leading to the enhancement of the corporate and national competitiveness.

(2) Characteristics of Industrial Cluster Policies

Industrial Cluster Policies are a range of policies developed and carried out by the government for the purpose of nurturing a specific industry in a particular area or reinforcing the innovation capability of existing industrial complexes. Even though the motives of the policies or the strategies to push them forward vary from country to country and from region to region, there are quite a few common factors in the establishment and implementation of the policies, as well as the keys to their success.

First of all, cluster policies should be implemented from a comprehensive perspective. OECD stresses that “cluster policies exist at the border of industrial policies, regional development policies and science & technology policies, and their ultimate goal is to strengthen industrial competitiveness through enhanced interconnection between the industry and the research sector.” Cluster policies make it possible to check and diagnose the link and bottleneck areas while keeping the whole picture in mind. Whereas policies implemented individually are generally less than optimal, and optimal conditions can be achieved through policies generated within the cluster system.

[The Range of Cluster Policy]



Cluster policies are synthetic in that they are combinations of industrial, science & technology, and regional development policies. They bring about an overall advancement of the industry by enhancing regional competitiveness.

(From: "Innovation Cluster," Committee on Balanced National Development, Feb. 2007)

Secondly, cluster policies focus not on individual constituents but on the building of networks among them. While it is important to support individual members so they can solve urgent problems and increase competitiveness, cluster policies place more emphasis on vitalizing interconnected networks, networks created through the collaboration of large companies and SMEs, joint researches of SMEs and universities or research institutes, and joint projects between SMEs.

Thirdly, cluster policies encourage the active participation of private sectors, as well as central and local governments in their planning and implementation. Even though cluster policies are initiated by the government, it is imperative that private sectors participate actively in the actual drawing

up and carrying out of these policies. Some researchers even say that the participation of private sectors is the most important part of cluster policies.

(3) The Effects of Industrial Clusters

What are the results that can be anticipated from building clusters? What are some advantages that concentrated companies have over diffused ones?

The most immediate effect of industrial clusters is that they can boost the efficiency of business administration. The enterprises in a cluster have easy access to input factors necessary for running a business, including suppliers, business supporting services, and labor force. They can also procure high quality input factors at low cost in a short amount of time. This is because related companies and organizations have already been concentrated in the area.

The effects of clusters are more remarkable in innovation achieved through networking. The innovation ranges over various fields such as marketing, process, and business models, as well as R&D and technology. Inside a cluster, tacit knowledge and know-how for innovation are easily accessible as proximity with other companies and organizations facilitates face-to-face communication.

Eventually improving business efficiency and innovating companies in a cluster can lead to the development of that industry in general. It can also help the local community by creating more jobs. In this way, regional innovation capability reinforces national competitiveness and becomes a contributing factor toward the national policy promoting balanced national development.

[The Effects of Industrial Clusters]

Internal Effects(Inside a Company)	External Effects(Policy, Environment)
<ul style="list-style-type: none"> - Easy access to input factors(suppliers, business supporting service, labor force,etc) - Cost reduction in transportation and communication - Easy acquisition of related information and know-how 	<ul style="list-style-type: none"> - Employment increase in the local community - industry development - Balanced national development

As the effects of industrial clusters became known and successful stories publicized, many countries in the world have plunged into the development of industrial cluster policies.

Silicon Valley and San Diego in the United States, Toyota Cluster in Japan, Cambridge Technopole in the U.K., Sophia Antipolis in France, Kista in Sweden, and Oulu in Finland are some good examples of large scale clusters set up by advanced countries to strengthen their national competitiveness. Interest in the clusters is currently spreading from the European countries and the United States to the whole world including South American and Asian countries.

[Current Status of Clusters in the World]



1.2 Transition of the Industrial Location Policy in Korea

Over the past 50 years of economic growth since the Korean War, the Korean government has implemented industrial location policies, which are similar to clusters. Industrial locations refer to geographical area where companies gather together to conduct business activities. Some examples are the steel industrial complex in Pohang, the machinery complex in Changwon, and the petrochemistry complex in Ulsan. Industrial locations are sites reserved and developed for industrial activities. The Korean government initiated the policy of designating industrial location to heighten the land efficiency of the nation and secure some of the territory for production and other industrial activities.

The Korean national industrial location policy started on the ruins of the Korean War(1950~53). At that time, it focused on flood control and forestation such as planting trees and building irrigation facilities. Sorting out the post-war confusion and building the infrastructure by repairing damages and constructing bridges and roads among other things were also priorities.

The industrial location policy of the 1960s and 1970s was centered in boosting national economic growth and industrialization by expanding industrial complexes and establishing a nationwide infrastructure which included main traffic networks, multipurpose dams, and harbor facilities. During this period, the main concern of the Korean government was finding an effective way to provide the material groundwork for the nation's industrial growth. Accordingly, developmental policies focused on concentrating

investment into certain locations and developing specific areas.

For example, Seoul and Incheon which have the agglomeration economies and infrastructure of large cities, and Ulsan which has a harbor and other conditions favorable for industrial activities were chosen as special areas for industrialization. Taebak and Youngsan River regions were designated as special areas for encouraging efficient investment in resource development.

[Industrial Policies and Major Industrial Complexes]

Period	the 1960s	the 1970s	the 1980s	since the 1990s
Industrial Policy	Light industry	Heavy and chemical industries	Technology-intensive industry	High tech IT industry
Core Businesses (Area)	Textile-Sewing (Guro)	Steel(Pohang) Machinery (Changwon), Electronics (Gumi), Petrochemistry (Ulsan)	Parts and materials (Banwon-Sihwa, Namdong)	IT(Seoul Digital), Semiconductors (Suwon), Automobiles (Ulsan)



Before 1980, Korean policy on national industrial location aimed at reinforcing local core capability by constructing special industrial zones or gaining footholds for further development. However, after 1980, the emphasis shifted to the balanced development of the nation as a whole. The goal of the national economic growth policy was altered from quantitative growth to balanced development for the sake of the nation's overall welfare. As a result, investment in infrastructure such as water supplies and sewage systems decreased. The emphasis of the government turned toward making more investments in improving social infrastructure in order to enhance personal well-being. The quality of life of the whole nation was to be improved through better housing, medical care, education, and social welfare.

Since the 1990s, regional development policy changed once again, pursuing balanced local development while also reinforcing national competitiveness. Regulations for the Seoul metropolitan area, which had been too strictly and rigidly policed, were made more appropriate.

[The Changes of Korean Industrial Location Policies]

	1950	1960	1970	1980	1990	2000
Principles of industrial location policy		Economic growth and industrial development promotion		Reducing regional disparity, balancing regional development	National and regional economic competitiveness reinforcement	Balanced development, innovation capability reinforcement
Policy measures	Sorting out post-war confusion	Industry placement and special zone construction	Hub development and large scale industrial complex construction	Planning and implementing balanced development national strategies	Construction and specialization by region	Implementing cluster policy and restructuring to innovation clusters
Main features		<ul style="list-style-type: none"> • Infrastructure expansion (Traffic networks, multipurpose dams, harbors, etc.) • Securing bases for industrial complexes • Establishment of the Seoul-Incheon export processing zone • Development of the Ulsan industrial complex • Development of marginalized regions 	<ul style="list-style-type: none"> • Nurturing heavy and chemical industries 	<ul style="list-style-type: none"> • Expansion of social services (Medical care, housing, traffic, welfare) 	<ul style="list-style-type: none"> • Nurturing hub cities for economic growth • Spreading middle and small sized industrial complexes all over the nation 	<ul style="list-style-type: none"> • Strengthening industry-university-institute networks • R&D capability enhancement • Conglomerates' autonomous capability enhancement and selective support for SMEs
stage of cluster development				Agglomerated zones	Specialized zones, Industrial zones	Study zones, Innovation zones

1.3 Industrial Cluster Policy in Korea

(1) Background of Industrial Cluster Policy

Korean economy has been achieving rapid growth since the 1960s, and its GDP per capita surged to more than \$10,000 in the middle of the 1990s from less than \$100 in the early 1960s. The Korean economy's unprecedented swift growth was due to the fact that the Korean government had initiated the industrialization policy and converted the nation from an agricultural nation into an industrialized one in a short amount of time.

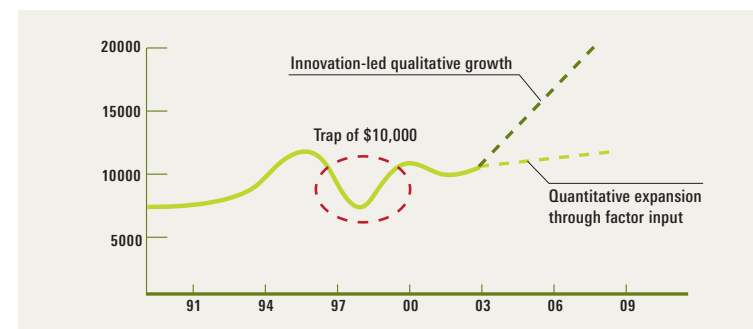
Specifically, since the 1970s, the Korean government implemented policies to construct large scale industrial complexes in certain areas and gathered specific industries in those complexes. For example, it built up a large scale research district in Daeduck and had institutes in the complex conduct researches necessary for national growth. In addition, the Korean government established and promoted special industrial complexes across the country: Pohang(steel), Changwon(machinery), Gumi(electronics), Ulsan(petrochemistry), and Banwon-Sihwa(parts and materials). Through the implementation of both industrial and science & technology policies in this manner, geographical distribution of industries was established: Daeduck for R&D, Seoul for planning and management, other regions for production. The separation of R&D and production sites dates back to this period.

The separation of the two sectors posed few problems during the stage when the Korean economy tried to catch up with advanced economies through

imitation. It even contributed toward some degree toward cost efficiency. However, as the Korean economy keeps expanding--Korea's GDP per capita already exceeded \$10,000 years ago--and Korea establishes itself as an economic competitor of advanced countries, such separation has become a serious drawback. For the innovation of companies and industries, constant collaboration between R&D and production sectors is indispensable, and in this respect, their division has been blocking innovation in the Korean economy.

For the Korean economy to jump to a higher level and join the rank of advanced economies, it was necessary to reverse the paradigm of the industrial and science & technology policies. In other words, a new policy paradigm is badly needed to link the two sectors geographically and functionally.

[The Trap of \$10,000 and Change in the Growth Paradigm]



The most effective way to achieve innovation-led growth is none other than the promotion of industrial cluster policies.

The industrial cluster policy in Korea was promoted to convert the Korean economy to an innovation-led growth system by upgrading existing R&D districts or production complexes to industrial clusters equipped with both production and R&D capacities where innovation keeps occurring on a regular basis.

(2) Driving Strategies and Features of Industrial Cluster Policy

Korea's national industrial cluster policy materialized into the balanced national development policy in the early 2000s. The balanced national development policy was based on three principles announced in June, 2003; first, decentralization of the nation and the promotion of comprehensive localization; second, establishment of the regional innovation system to help the local regions become self-supportive; third, preferential nurturing of local regions and building up a basis for the mutual development of local and Seoul metropolitan areas through systematic control of the latter.

[Vision and Strategies of Balanced National Development(2004)]

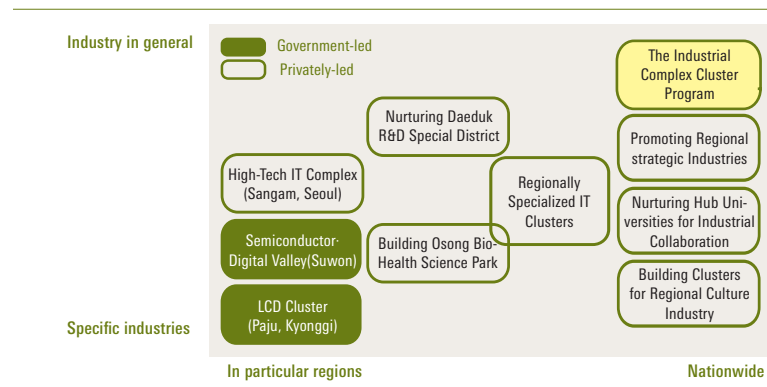
Vision	A multi-core and creative society with balanced development	
↑		
Direction	<ul style="list-style-type: none">•Specialized development by region•Inter-connected development of the regions•Improvement of spatial quality and life quality	
↑		
Five strategies	Innovation policy	<ul style="list-style-type: none">•Building up a regional innovation system•Reinforcing the innovation capability of regional universities•Expanding investment on regional R&D
	Balance policy	<ul style="list-style-type: none">•Vitalizing undeveloped regions•Running special districts for regional specialized development
	Industry policy	<ul style="list-style-type: none">•Nurturing regional strategic industries•Fostering innovation clusters
	Space policy	<ul style="list-style-type: none">•Building up a multifunctional administrative city•Transferring public organizations and building innovation cities•Constructing company cities
	Qualitative development policy	<ul style="list-style-type: none">•Making cities a better place to live•Metropolitan area's qualitative development
↑		
Institutional Basis	<ul style="list-style-type: none">•Five-year development plan for balanced national development•Special budget for balanced national development•Special law for balanced national development	

In line with the three principles, five strategies and 12 policies were suggested, and a variety of projects were promoted, some of which were government-led, others led by private sectors. Some projects were promoted nationwide while others targeted specific regions.

Some government-led projects promoted building infrastructure, developing technologies, and enhancing networking nationwide such as "Turning Industrial Complexes to Innovation Clusters," "Promoting Regional Strategic

Industries,” “Nurturing Hub Universities for Industrial Collaboration.” Meanwhile, other projects were focused on building core capabilities of particular regions such as “Nurturing Daeduk R&D Special District,” “Building Osong Bio-Health Science Park,” and “High-Tech IT Complex” at Sangam, Seoul. Also other clusters led by global companies have formed spontaneously and developed such as Semiconductor and Digital Valley in Suwon-Giheung and LCD Cluster in Paju.

[Types of Cluster Projects]



[The Cluster programs in Korea]

Types	Status and Details
Government-Supported	
The Industrial Complex Cluster program	<ul style="list-style-type: none"> Drawing up a comprehensive plan(June, 04) and implementing it in 12 industrial complexes <ul style="list-style-type: none"> * Changwon, Gumi, Ulsan, Gwangju, Banwol, Wonju, Gunsan, Namdong, Daebul, Noksan, Seongseo, Ochang Consolidating networking through 36 mini clusters <ul style="list-style-type: none"> - Support for troubleshooting in R&D and marketing(\$53.2 million, 07 budget)
Promoting Regional Strategic Industries	<ul style="list-style-type: none"> Supporting regional strategic industries: 4 regions(2nd phase) and 9 regions(1st phase) <ul style="list-style-type: none"> - Support for infrastructure building, technology development, and education in a package(\$368 million, 07 budget) * 4 areas of 2nd phase('04~'08) and 9 areas of 1st phase('02~'07) Regional R&D capability reinforcement through RIS and Regional Technology Innovation Project
Nurturing Daeduck R&D Special District	<ul style="list-style-type: none"> Drawing up a comprehensive nurturing plan(Apr. 04) and approving of special district laws in the National Assembly(Dec. 04) Starting Special District Support Center(Sep. 05) and concentrating on creating special district business models <ul style="list-style-type: none"> - Constructing global venture eco-system including Institute company establishment support and high-tech company foundation(\$43.4 million, 07 budget)
Nurturing Hub Universities for Industrial Collaboration	<ul style="list-style-type: none"> Promoting collaboration and inspiring the need for collaboration between universities and neighboring industrial parks by supporting 13 universities in various regions for educational system reform, technology development, and manpower training('04~'08)
Building Osong Bio-Health Science Park	<ul style="list-style-type: none"> Planning to move 5 government-run organizations including Korea Food and Drug Administration(KFDA)(until '10) Carrying out development for the site and completing distribution of production facility sites(Oct. '07)(\$262.3 million, 07 budget)
Building Clusters for Regional Culture Industry	<ul style="list-style-type: none"> Building specialized culture industry clusters and culture industry promotion districts in various regions <ul style="list-style-type: none"> - Support for regional culture industrial clusters in 6 regions including Daegu (providing space and equipment, etc.) and planning to designate culture industry promotion districts(\$128.3 million 07 budget)
High-Tech IT Complex	<ul style="list-style-type: none"> Creating a high-tech complex in DMC, Sangam to help Korea leap into East-Asian IT hub <ul style="list-style-type: none"> - Inducing domestic and foreign excellent IT companies and R&D centers (\$127 million, 07 budget)
Regionally Specialized IT Clusters	<ul style="list-style-type: none"> Running IT specialized institutes in 3 regions to strengthen regional IT R&D capability and IT coordinative committee to help nurture specialized sector by region (Daegu, Kyongbuk, and Gangyang Regions)(\$3.9 million, 07 budget)
Privately-Led	
University-Centered Clusters	<ul style="list-style-type: none"> Nurturing POSTEC(Pohang) into a supply base of high-tech materials <ul style="list-style-type: none"> - Nurturing Hanyang University and Korea Polytechnic University(Banwol-Sihwa) into university-institute-industry linking clusters
Company-Centered Clusters	<ul style="list-style-type: none"> Samsung Electronics(Suwonn, Giheung): semiconductor-digital valley (sales goal of 08: \$41.7 billion) LG Philips(Paju): LCD cluster(sales goal of -10: \$17.4 billion)

Among the several projects of the Cluster Program, “Turning industrial complexes to innovatiou clusters” or “Industrial Complex Cluster Program” was promoted to create innovation and strengthen the competitiveness of companies by sharing information and knowledge among universities, research institutes, supporting organizations and companies with existing industrial complexes at the center.

The Program started with seven pilot complexes in 2005, and added five more complexes in 2008 to expand it to a nationwide program.

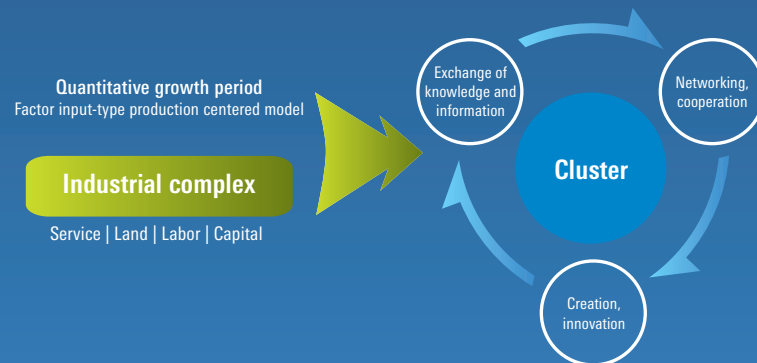
The most important project of the Program was building an innovation system through networking. The project focused on establishing systems through which companies, universities, institutes and local governments in the region would cooperate and pursue development unique to their region. It provided education for innovation leaders who could boost the planning capability and increase responsibility in the region. It also supported spontaneous research groups, and helped diffuse learning groups through the region.

II. The Industrial Complex Cluster Program of Korea

2.1 Background

Industrial complexes have led the development of major industries, playing a key role in developing regional economies and improving national competitiveness. As of 2008, they account for 72% of all manufacturing exports, 59% of production, and 43% of employment, which shows that they are pivotal to the Korean economy.

[Concept of Industrial Clusters]



Most of them, however, were just production agglomeration, and not equipped with sufficient R&D capability. It was evaluated that while quantitative growth was achieved by constructing industrial complexes and housing companies in them, their quality was not up to par in terms of infrastructure for industry-university-institute collaboration or R&D. Industrial complexes, which had been the backbone of industrial production in the period of quantitative growth, could no longer play a crucial role with the existing operating system in the knowledge economy age.

For example, Korea's representative complexes, Gumi and Changwon, are assessed as having only half the competitiveness of advanced clusters such as Silicon Valley and Oulu. On a scale of 0 to 100, with advanced clusters at 100, Korean clusters were rated at 40 in interconnection between companies, 58 in industry-university-institute collaboration, and 45 in R&D capability, according to the data of KIET, 2006.

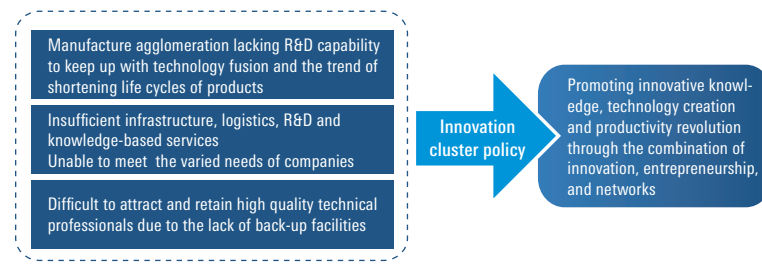
However, the problem of Korean economy does not have to be addressed by shutting down existing industrial complexes and creating entirely new policies. Industrial complexes, which are currently just production agglomerations, have the potential to become innovation clusters when complemented with necessary functions. If this is successfully achieved, Korean economy can be transferred into an innovation-led growth system in a short time.

It was agreed that what was required for Korean economy was a change in the paradigm of Korean industrial policies, a focus on qualitative growth instead of quantitative. As a result, new programs were planned and enacted to foster industrial clusters in which knowledge and information could circulate

in a virtuous cycle by stressing the industry-university-institute interconnection and strengthening the R&D capabilities of existing complexes.

Korea has been carrying out the Industrial Complex Cluster Program(ICCP) on the seven model complexes in each hub region to upgrade current complexes into global innovation clusters centered among their main businesses. Specifically it has focused on complementing research functions to current industrial complexes including consolidating open networks(industry-university-institute), reinforcing R&D capabilities, enhancing inter-cluster exchange and collaboration, and improving the living and working conditions of each complex.

[Background of the Industrial Complex Clusters Program]



2.2 Strategies and Projects

The Korean government adopted 5 strategies to promote the Industrial

Complex Cluster Program(ICCP) in 2004. They were building a collaborative and open network of industry-university-institute-government, strengthening corporate R&D capability, improving housing and working conditions for high quality technical professionals, building open clusters with domestic and foreign connections, and heightening the connection between government policies and regional innovation programs.

Based on these strategies, specific promotion projects have been created and are being carried out.

[Strategies and Projects of the Industrial Cluster Program]

Strategies	Projects
Building collaborative and open networks of industry-university-institute-government	<ul style="list-style-type: none"> • Constituting small-size industry-university-institute alliances(mini-clusters) by business field and by technology • Implementing industry-university-institute collaboration projects, expanding infrastructure, and carrying out core original technology development projects
Strengthening corporate R&D capability	<ul style="list-style-type: none"> • Promoting to connect existing R&D projects and the Cluster Program • Complementing regional R&D capability through the establishment of branches of public research institutes • Transferring technologies of universities and institutes to companies
Improving housing and working conditions for high quality technical professionals	<ul style="list-style-type: none"> • Regenerating industrial complexes by structure heightening • Establishing comprehensive cluster support centers including culture and welfare facilities for workers • Constructing new towns near model industrial complexes with housing environments coordinated with education and culture
Building open clusters with domestic and foreign connections	<ul style="list-style-type: none"> • Expanding collaboration and exchange with prestigious domestic universities and institutes • Expanding collaboration and exchange with model complexes and advanced clusters • Inducing foreign investment in high-tech companies and R&D centers in strategic business fields
Strengthening the connection between government policies and regional innovation projects	<ul style="list-style-type: none"> • Connecting R&D infrastructure, core technology development and custom education project with regional innovation projects • Connecting Hub Universities for Industrial Collaboration Project, technology development project, and regional innovation specialization projects with government programs • Securing communication channels through on-line cluster networks

2.3 Progress of the Program

(1) Building Up Industrial Complex Clusters

The Korean government chose ‘A Plan to Convert Industrial Complexes to Clusters’ as a government policy program in June 2004 with the consolidation of industry-university-institute networks, the reinforcement of R&D capability, and the improvement of housing conditions as its major policy measures. The program came into full swing in April 2005.

[Progress of the Industrial Cluster Program]

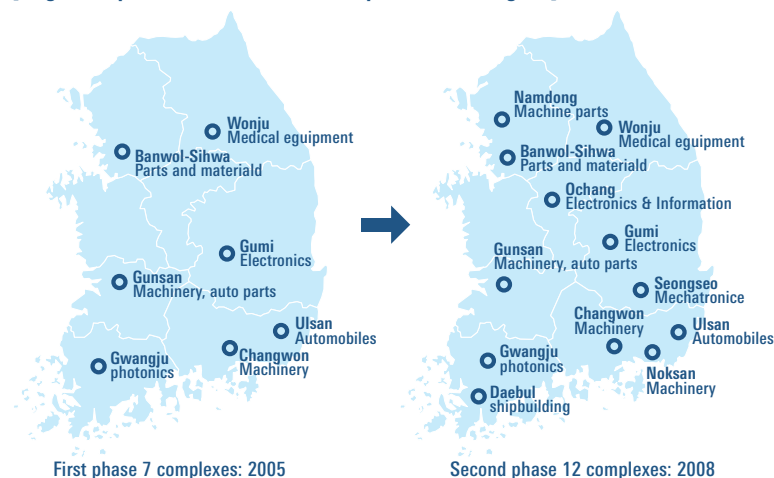
Period	Details
Jun. 04	Reported plans for converting industrial complexes into innovation clusters (45th government program briefing meeting) : Confirmed the plan of innovation clusters and appointed 7 pilot complexes
Apr. 05	Started to enact the Industrial Cluster Program on the 7 pilot complexes : Gumi(electronic), Changwon(machinery), Ulsan(automobile), Banwol-Sihwa(parts and material), Gwangju(photonics), Wonju(medical equipment), Gunsan(machinery, auto parts)
Dec. 06	Reported on “Progress of the Industrial Cluster Program” : the outcome of the Cluster Program confirmed and ways to diffuse the outcome sought(Briefing meeting of site inspection of the Balanced National Development Committee)
Nov. 07	Appointed 5 additional complexes to diffuse the outcome of the program : Namdong(Incheon), MungjiNoksan(Busan), Seongseo(Daegu), Daebul(Jeonnam), Ochang(Chungbuk)
Sep. 09	Expansive and reformative version of “Industrial Agglomeration Competitiveness Reinforcement Program” announced by the government: Adjusting the program from focusing on current 12 industrial complexes to future pan regional economic zones
Feb. 10	Detailed action plan of the new version of “Industrial Agglomeration Competitiveness Reinforcement program” announced by the government
Apr. 10	System improvement plan of the Industrial Cluster Program announced(Ministry of Knowledge Economy) : Expanding current 12 industrial complexes to hub-spoke type pan regional clusters with 193 industrial complexes Announced strategies for building sustainable & self-sufficient clusters with 25 hubs and 168 spokes

Korea Industrial Complex Corp. took the control of the whole program, and promotion teams were organized for each complex as agents of the project.

At the beginning, seven complexes were appointed as the targets: Gumi(electronics), Changwon(machinery), Ulsan(automobiles), Banwol-Sihwa(parts and materials), Gwangju(photonics), Wonju(medical equipment), and Gunsan(machinery-auto parts). Major projects at the early stage of the Program were “Building Up Networks of Industry-University-Institute” and “Providing R&D Support.” In other words, the Program focused on connecting companies within the complex with associated research institutes, universities, and supporting organizations into a cooperative network, and discovering and supporting collaborative projects at all times.

As the base for industrial complex clusters was constructed and various experiences associated with the cluster policy were accumulated, five more complexes were added to diffuse the outcome of the Program in 2008. Namdong(machine parts), MungjiNoksan(machinery), Seongseo(mechatronics), Daebul(shipbuilding), and Ochang(electronic information) were added, and their main projects were “Enhancing Technology Innovation Capability” and “Reinforcing Company Competitiveness.”

[Target Complexes of the Industrial Complex Cluster Program]



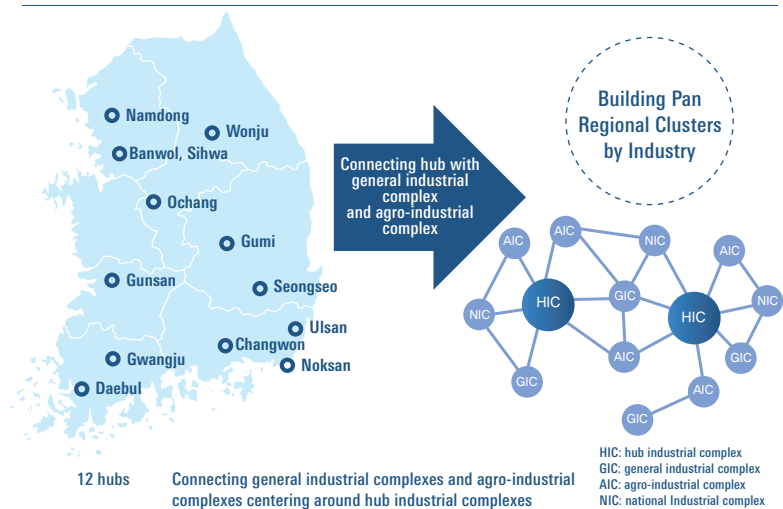
(2) Conversion to Pan Regional Cluster Policy

The Industrial complex Cluster Program (ICCP) which started in 2005 and concluded in 2009 with 12 industrial complexes, achieved a remarkable outcome of vitalizing industry-university-institute networks and reinforcing the R&D capability of the complexes. Meanwhile, as the innovation capability of each complex improved and the companies in each complex could not find what they wanted in the specific complex, it was suggested that the existing clusters be extended to pan regions.

The government started to promote the pan regional cluster program since 2010. This has been useful in dispelling disputes about favoritism, which have arisen as government support was concentrated in a few companies in

certain complexes. It has also helped companies take advantage of outside innovation resources and extend their operation fields outside of the cluster.

[Building UP Pan Regional Clusters]



Building up pan regional clusters means spreading out what was accomplished through the existing cluster program to other industrial complexes nationwide by their pan regional economic zones. Each pan regional cluster is respectively made up of an integration of more than two metropolises or provinces. In this way, 5+2 pan regions were designated out of 16 metropolises and provinces while taking many factors into consideration such as population, main industries, infrastructure, historical and cultural identities, and public sentiment: the Seoul metropolitan region (Seoul, Incheon, Kyonggi), the Chungcheong region (Daejeon, Chungnam, Chungbuk), the Honam region (Gwangju, Junnam, Junbuk), the Daekyung region (Daegu, Kyungbuk),

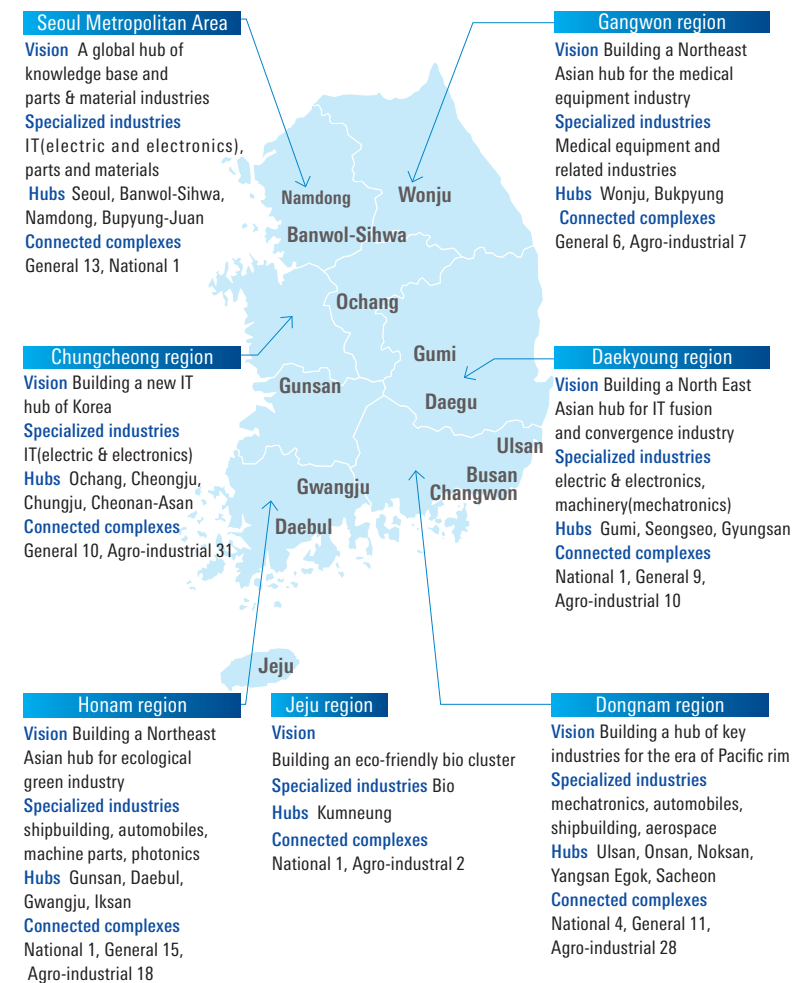
the Dongnam region(Busan, Ulsan, Kyungnam) plus the Gangwon and Jeju regions.

In addition, hub-spoke type pan regional clusters have been promoted to distribute the outcome of the Cluster Program to other regions around the nation. The targets of the Program, which were 12 pilot complexes, have been expanded into about 193 complexes and the connection between different kinds of complexes, national, general and agricultural, is being strengthened.

[Building UP Pan Regional Clusters]

Basic Policy	Details
Distributing the outcome of cluster program nationwide	Expanding 12 clusters into about 193 ones
Building hub-spoke type pan regional clusters	Building clusters linking national, general and agricultural industrial complexes
Enacting pan-regional integration stage by stage	Expanding stage by stage: individual complex(hub) → neighboring(connected) complex → pan-regional zone → nationwide
Connecting with knowledge based industrial complex conversion policy	Pushing forward in connection with governmental renovation of industrial complexes and improvement of management system

[5+2 Pan Regional Economic Zones and their Specialized Industries]



[Change in Industrial Cluster Policies]

Type	2005~2007	2008~2009	After 2010
Goal	Building up the basis of clusters	Diffusing the outcome of clusters	Building up pan-regional clusters
Agencies	7 agencies mini clusters	12 agencies mini clusters	6 pan-regional/hub agencies pan regional mini clusters
Target industrial complexes	7 complexes	12 complexes including 5 later appointed ones	5+2 pan regions (193 pan-regional clusters)
Main projects	<ul style="list-style-type: none"> • Operating mini clusters and building networks of industry-university-institute • Project for innovation capability enhancement • Project for business competitiveness reinforcement • Project to support labor and capital • Collaboration and exchange with overseas clusters • Diffusing innovation spirit into regions 	<ul style="list-style-type: none"> • Operating mini clusters and building networks of industry-university-institute • Project for innovation capability enhancement • Project for business competitiveness reinforcement 	<ul style="list-style-type: none"> • Project for expediting corporate growth • Project for vitalizing network among pan-regions • Project for vitalizing knowledge industry agglomeration • Project for boosting global competitiveness
Budget (million dollars)	2005 : 25.8 2006 : 40.3 2007 : 47.1	2008 : 69.4 2009 : 59.8	2010 : 58.2 (Budgets were assigned to pan regional economical zones since 2010.)

2.4 Characteristics and Implications

The Industrial Complex Cluster Program(ICCP) of Korea is characterized by the fact that it has been led by the government and that it has constructed a Korean-type program model where every task, from discovering the projects to completing them, is carried out in the collaboration with all the participants. Unlike other programs promoted through public contests, the Program is constantly discovering new challenges and putting its budget toward meeting them.

The first characteristic of the Cluster Program of Korea is that it has targeted existing industrial complexes where companies have already agglomerated. Instead of launching the program in new places, it has been implemented around industries and core capabilities of existing industrial complexes like Incheon, Sihwa-Banwol, Changwon, Gwangju, Gunsan, and Ulsan. For this reason, the Program is called the Industrial Complex Cluster Program.

Secondly, the program has been promoted by the sustainable network alliances of each agency. An agency consists of mini clusters(with companies in the complexes, universities and research institutes), supporting organization alliances(with local governments, innovation parks), and a pool of experts in the field. The agency plays the role of broker and identifies and completes them through networks. It supports projects in connection with other policy programs through networking alliances.

And thirdly, the Program is distinctive in that it promotes separate projects based on the characteristics of each complex or region. In one complex, the focus of the program is providing business sites, while in other complexes, its main objective is to attract investment, or nurture strategic industries. Complexes have been concentrated on industries that they already have core capability in or industries fit for utilizing the regional characteristics of the region. For example, Changwon, which has accumulated capability in the machining industry, has implemented projects focusing on machinery while Gumi focuses on electronics, Gunsan on machinery & automobiles, and Daebul on shipbuilding.

Finally, the Cluster Program of Korea is unique in that it discovers

difficulties through networking from the perspective of customers and supports business activities in all their stages. When there is a demand for technology innovation or development of new technology from a company, the program supports it in every stage, from planning to execution. Alliances of mini clusters, experts and supporting organizations perform the feasibility analyses of business and technology, provide various professional knowledge in developing technologies, and support commercialization and even sales after the development.

The Industrial Complex Cluster Project is being carried out because of the necessity to strengthen the regional and national competitiveness and to promote balanced regional development in the course of the economic development of the country. Some people say that Korea lags by 10 years in the implementation of the cluster policy compared with other advanced countries, which instituted the policies in the 1990s.

However, Korea has its own advantages in that it has already retained physical space for clusters, namely, industrial complexes with core capabilities, which can be easily converted into innovation clusters. In fact, every industrial complex cluster is rapidly strengthening its competitiveness by specializing in particular industries based on their core capabilities and geographical conditions. And, as the program is led by the government, some projects that need extended time and a substantial budget can also be aggressively promoted.

Notably, a Korean model of an industrial cluster has been developed and implemented. In the Korean model of a cluster, innovation capacities are strengthened and sustainable development is rendered possible through mini

clusters in each cluster and their networking in discovering, implementing and completing projects.

The Program is approaching the goal of making “global innovation clusters” with the government’s planning and coordination in harmony with private sectors’ autonomy and innovation capabilities.

Concept	Mini Cluster Activities		Brokering Activities	
System	Identifying & discovering problems	Turning the problems into projects	Finding ways to solve the problems	Completing the projects
Activity	Community	Communication	Connecting	Creation
	Visiting companies Forums Seminars	Predicting technology demand Analysis of marketability Planning projects	Matching industry university institute government Solving through coordinating Policy connecting ·Brokering	Industry university institute joint R&D Management, manpower, marketing, technology transfer-commercialization
Actor [Expert]	Company	Entrepreneurship, industry-university-institute joint R&D, main agent of technology innovation		
	University	Industry-university joint R&D, education, support for equipment use		
	Institute	Industry-institute joint R&D, technology transfer-commercialization, support for equipment use		
Broker	Agency (KICOX)	Acting as a broker of network activities connecting the industry, university, institute, and government		

III. The Process and Outcome of the Program

3.1 Outline of the Program

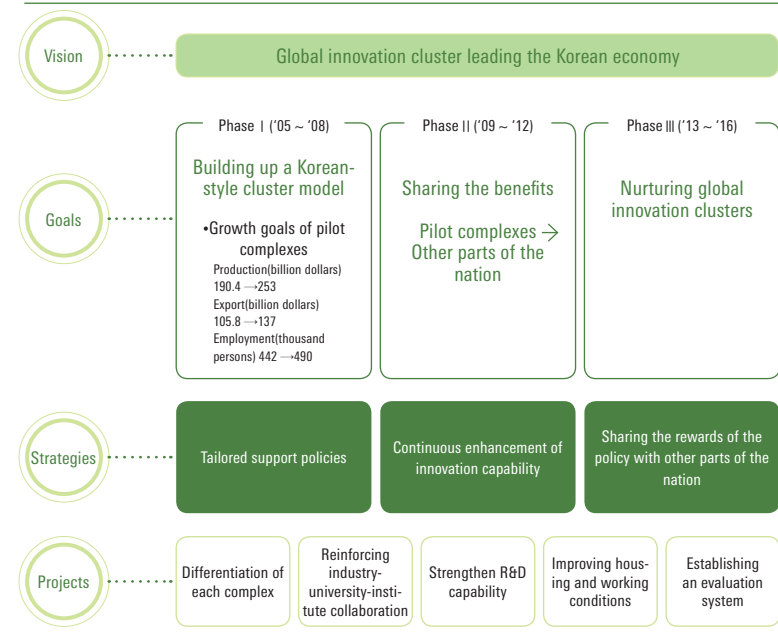
(1) Vision and Strategies

The Industrial Complex Cluster Program of Korea (ICCP) started with the vision of “creating global innovation clusters to lead Korean economy.” It is directly connected with the vision of the Balanced National Development Plan, which promotes “multi-core & creative society developed with balance.” To achieve the vision of ICCP, supporting measures customized for each cluster have been developed and implemented, and specific strategies have been planned and promoted to expand the innovation capability of clusters and share the rewards of the policy with other parts of the nation.

ICCP, which started in 2005 and will be completed in 2016, is divided into three phases. Different goals have been set up for each phase, for the first phase, building the Korean-style cluster model (2005-2008); for the second, sharing the benefits of pilot complexes (2009-2012); and for the third, building global innovation clusters (2013-2016).

When the Program is completed in 2016, each cluster will possess sustainable self-sufficiency, including inter-business networks, aggressive entrepreneurship, and heightened innovative awareness. At that time every cluster is expected to play a powerful role in boosting the Korean economy.

[Vision and Strategies of the ICCP]



(2) Related Regulations and Institutions

The Industrial Complex Cluster Program of Korea has been led by the Korean government. It has been regulated and carried out in accordance with Korean law throughout every stage of its planning, implementation, and evaluation.

Korean Regional Industry Support System and Industrial Cluster Policy are, in turn, based on 'Industrial Development Law' legislated in 1999. The Law provided the grounds for the establishment of regional industrial promotion

projects in various cities and provinces. It also offered the basis for the central government's support of those projects. In accordance with the law, each city or province could make systematic plans for an extended industrial promotion that reflects its own unique characteristics and conditions.

In December 2002, the 'Industrial Placement and Factory Construction Act' was revised to become the 'Industrial Cluster Development and Factory Establishment Act,' which provided the basis for laying out a five-year basic plan for industrial agglomeration enhancement. Part of the Act was amended again in March 2006 to clarify the promotion agencies of the Program and the parties in charge of budget execution.

[Legal Basic for the Implementation of the ICCP]

"Industrial Cluster Development and Factory Establishment Act"(revised in March 2006)

Article 2(Industrial Complex Innovation Program) : Program to enhance competitiveness of industrial complexes by having companies, universities, research institutes and supporting organizations exchange & connect knowledge information and technology with industrial complexes at the center

Article 22 - 2(Planning for Innovation Program) : The Minister of Knowledge Economy publishes the general plan, detailed procedure, and management plan of the Innovation Program, and grants or supports the budget for it to Korea Industrial Complex Corp.

In December 2003, 'the Special Act on the Balanced National Development' was legislated for the purpose of developing the nation in a well-balanced Fashion. A five-year action plan was made under the initiative of the Presidential Committee on Balanced National Development, and various specific projects of the Industrial Complex Cluster Program were launched with the support of the Special Budget for Balanced National Development.

[Laws and Policies Related to ICCP]

[Laws and Policies Related to ICCP] Legal basis	Framework Act on the National Land	Special Act on Balanced National Development	Industrial Cluster Development and Factory Establishment Act
Major policy(plan)	The Fourth Comprehensive National Land Planning	Five Year Plan for the Balanced National Development	Basic Plan for the Industrial Cluster Development
Period	2000~2020	2004~2008	2004~2008
Goals	<ul style="list-style-type: none"> • Coexisting in a balanced territory where everyone is happy • Green territory in harmony with nature • Open territory that welcomes the world • United territory with the whole nation in harmony 	<ul style="list-style-type: none"> • Constructing a society where wealth is shared and individuality is respected • Uniting the nation and enhancing competitiveness 	<ul style="list-style-type: none"> • Industry strengthening the connection with regional specialization of industries • Enhancing industrial competitiveness enhancement and balanced regional development
Policy measures	<ul style="list-style-type: none"> • Coordinating and controlling sub-plans • Construction of mainstay social overhead capital(SOC) • Differentiated support for different regions 	<ul style="list-style-type: none"> • Constructing regional innovation systems • Securing financial resources • Distributing national nuclei into various regions 	<ul style="list-style-type: none"> • Regional strategic industry promotion project • Knowledge base industry agglomeration district • Inter-cluster connection project by regions
Distinctive features	<ul style="list-style-type: none"> • Giving direction to the policies of population, industry, infrastructure supply • Long term plan 	<ul style="list-style-type: none"> • Embracing all existing plans of central and local governments • Bottom-up planning • Extended plan 	<ul style="list-style-type: none"> • Policy guideline for central and local governments in relation to regional industrial development • Extended plan

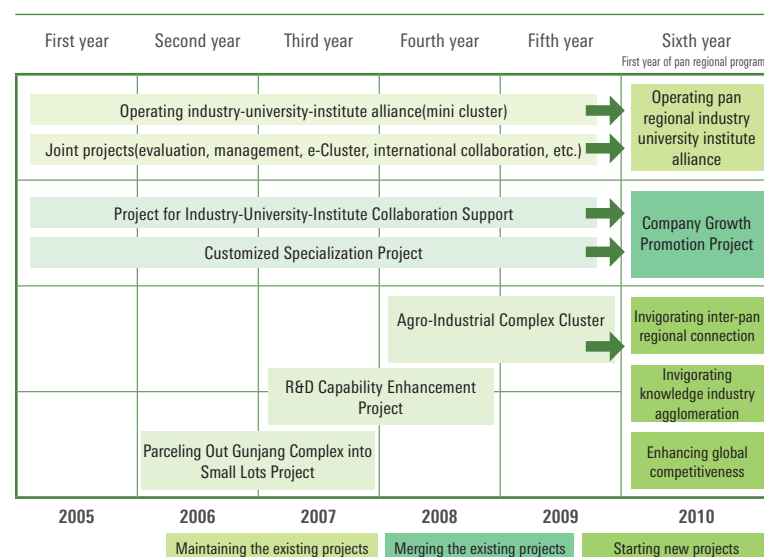
(3) Individual Projects

In 2005, the first year of the ICCP, the focus was on constructing industry-university-institute networks, customized specialization programs, and joint projects. In 2006, the Project of parceling Out Gunjang Complex into Small Lots was added, which helped to construct an innovation cluster system in the Gunsan region.

Moreover, since 2007, an R&D Capability Enhancement Project has

been planned and implemented to supply and upgrade the equipment for R&D centers of some complexes and to promote joint R&D between industry-university-institute. In addition, since 2008, in order to introduce industry-university-institute network to the relatively backward agro-industrial complexes nationwide, Agro-Industry Complex Cluster Project has been promoted.

[Details of Major Projects]



The Project for Industry-University-Institute Collaboration Support and Customized Specialization Project were promoted as Project to Strengthen Technology Innovation Capability or The Project to Strengthen Corporate Competitiveness in accordance with their goals.

With the launching of the Pan Regional Cluster Program in 2010, existing projects also had to change the direction of their policies. They were simplified and changes were made to strengthen regional autonomy. Also in order to

promote regional integration and globalization, several new projects were introduced.

[Policy Direction of Pan Regional Cluster Program]

Policy Direction	Details
Simplifying existing projects	Merging 11 existing industry university institute collaboration support projects into 5
Launching pan regional new projects	Launching 3 new projects for regional integration and globalization
Strengthening regional autonomy	Substantial handover of project evaluation and management to regions
Differentiation of support size	Differential support based on inter-business connection and outcome
Reducing numbers of large & medium size projects	Merging repetitive or overlapping projects

(From: "Detailed Action Plan for Pan Regional Reform of the Cluster Program," Ministry of Knowledge Economy, Jan. 2010)

The majority of existing projects were projects for supporting industry-university-institute collaboration, 11 of which were merged into 5 and given a new title, Company Growth Nurturing Projects.

In addition, new projects suitable for the pan regional cluster program were launched: The Project for Invigorating Pan Regional Alliance, The Project for Invigorating Knowledge Industry Agglomeration and the Project for Enhancing Global Competitiveness.

The objective of the Project for Invigorating Pan Regional Alliance is to build a mega regional industry-university-institute network. The Project aims to reinforce win-win collaboration between large, medium and small companies, promote joint R&D in the mega region, and build green clusters.

The focus of the Project for Invigorating Knowledge Industry Agglomeration is building a solid basis for clusters. The Project focuses on

supporting the founding of new businesses, attracting companies to the cluster, helping companies find business opportunities in high-tech fields, and enhancing the complex's image. These Projects are supposed to be implemented under the supervision of each hub complex.

The Project for Enhancing Global Competitiveness strives to vitalize overseas networks, promote the utilization of overseas technology, and nurture global talents. The Project is implemented by hub complexes.

[Changes in the Projects since the Launch of the Pan Regional Cluster Program]

Existing programs	Restructured programs	Note
Operating industry-university-institute alliance	Operating pan regional industry university institute alliance	Maintaining existing projects
Project to support industry university institute collaboration 1. Tailored technology development 2. Commercialization of transferred technology 3. Application of industrial property rights 4. Manufacturing of trial products 5. Test analysis 6. Overseas standard certification 7. Product packaging design 8. Joint marketing 9. Overseas market development 10. Customized education 11. Mentoring for problem solving	Company growth nurturing project 1. Commercialization of manufacturing technology 2. Support for product manufacturing 3. Total marketing 4. Tailored education and training 5. Customized comprehensive support	Merging existing projects(from 11 to 5)
Tailored specialization project		Merging into company growth nurturing project
	Invigorating inter-pan regional connection	Launching new projects
	Invigorating knowledge industry agglomeration	Launching new projects
	Enhancing global competitiveness	Launching new projects

(From: "Detailed Action Plan for Pan Regional Reform of the Cluster Program," Ministry of Knowledge Economy, Jan. 2010)

3.2 The Framework and Process

(1) Summary

The Industrial Complex Cluster Program of Korea has experienced two big changes in its management system since it started with seven pilot industrial complexes in 2005(the first year). It was expanded into 12 complexes in 2008(the fourth year) and pan-regional clusters began to operate in 2010(the sixth year). As a result, the exclusive agency of the Program and its role changed, as did the evaluation system and its main projects.

[Changes in the Management System of the ICCP]

Type	First phase(2005-2007)	Second phase(2008-2009)	Third phase(2010~)
Project priority	Formulating various guidelines Developing business models	Expanding clusters nationwide Outcome-oriented management	Cluster integration Enhancing global competitiveness
Governance	Managed mainly by directors Evaluation committee, expert pool, coordinator	Managed mainly by directors(Changwon, Banwol, Gumi managed by directors of other complexes)	Unified management by KICOX, Managed mainly by head directors Expert pool, evaluation pool, and coordinators into pan regional economic zones
Target complexes	7 complexes → Changwon, Gumi, Ulsan, Banwol-Sihwa, Gwangju, Wonju, Gunsan	12 complexes → Namdong, Ochang, Seongseo, Noksan, Daebul added to the existing 7 complexes	Building up pan regional mini clusters(5+2) → Seoul Metropolitan, Chungcheong, Daekyung, Dongnam, Honam, Gangwon, Jeju
Project programs	Promoted 13 projects including Project for Enhancing Technology Innovation Capability, Project for Reinforcing Company Competitiveness, etc.	Promoted 11 projects including Specialization Project, R&D Capability Enhancement Project, etc.	Integrated into 5 projects (New projects : Pan Regional Alliance Project, Project for Invigorating Knowledge Industry Agglomeration, Project for Enhancing Global Competitiveness)
Evaluation System	Evaluated by 7 agencies Evaluation index: 17 index in 5 fields	Evaluated by 12 agencies Evaluation index: 17 index in 4 fields	Evaluated by 6 pan regional headquarters Evaluation index: Managed by each pan region (Evaluating MCs, regional headquarters, and customer satisfaction)
Budget Execution Method	Assigned to each agency headquarters		Assigned to each pan regional headquarters
Support information system	e-Cluster and Cluster Management System		

Industrial Complex Corp.(KICOX), to which the Ministry outsourced the tasks of controlling, planning, evaluating, and managing the whole Program.

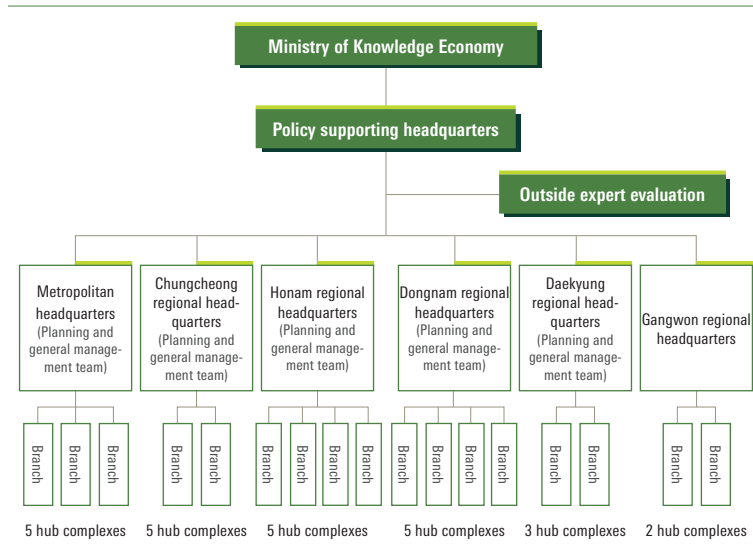
KICOX implemented various projects for individual pilot complexes by establishing 'cluster agencies' for each complex. Each agency consisted of mini clusters with companies, universities, and research institutes in the region, a pool of experts that provides assistance in technology or management, and supporting organizational alliances consisting of local governmental bodies and Techno Parks(TP). The agencies took the responsibility of making extended plans for their clusters as well as discovering, implementing, and evaluating specific projects. The ICCP started out with seven agencies and five more were added in 2008 so that until March, 2010, twelve agencies were in operation.

With the organization of pan regional clusters in 2010, the existing 12 agencies were restructured into 6 pan regional headquarters and their branches. Each pan regional headquarters will serve as a hub headquarters and manage, plan, evaluate, and control projects within their region. The branches are supposed to operate mini clusters associated with specialized industries, a task formerly performed by cluster agencies. They will also discover projects intended to cope with difficulties of the companies and provide necessary assistance.

(2) Agencies and their Roles

The Industrial Complex Cluster Program(ICCP) is under the supervision of the Ministry of Knowledge Economy, which oversees the whole program from planning policies to modifying laws and systems. The details of the program are the responsibility of Policy Supporting Headquarters of Korea

[Management System after Restructuring to Pan Regional Clusters]



(From: "Detailed Action Plan for Pan Regional Reform of the Cluster Program," Ministry of Knowledge Economy, Jan. 2010)

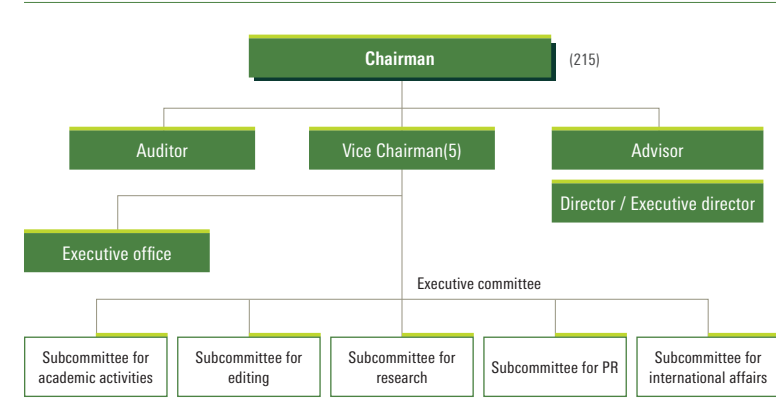
Meanwhile, it was agreed that for the continuous promotion of the Cluster Program, academic research to back up the Program and a network of experts from all the sectors were indispensable. The agreement resulted in the foundation of Korea Academic Society of Industrial Cluster(KASIC) in June 2006.

The goal of KASIC is "to contribute to sound development of the national economy, specifically to the continuous advancement of industry and balanced regional development. This can be achieved by promoting research on industrial clusters and regional innovation, and by encouraging exchange and collaboration of experts in industry, universities, research institutes, governments and associated organizations."

KASIC consists of about 200 members, including a chairman, several vice-chairmen and executive directors. Its main job is to conduct research or surveys for the promotion of industrial clusters on regional, national, and world industrial policies as well as policies in other various areas, such as science & technology, education, regional development, and regional innovation. It hosts domestic or international conferences, forums, symposiums and lectures, and it also periodically publishes a journal, Industrial Cluster, as well as sourcebooks from extensive researches.

[Organization Chart of KASIC]

<http://www.kasic.or.kr>



(3) Types of the Programs

Until 2009, major programs for industrial clusters were classified into The Project for Building Up Industry University Institute Network, The Customized

Specialization Project, R&D Capability Reinforcement Project, The Project for Parceling Out Gunjang Complex into Small Lots, Agro-Industrial Cluster Project, and Joint Projects.

[Categories of Cluster-Supporting Programs]

Classification of Programs to Support Clusters			
	Projects to promote the Program	Main target	Main goal
Cluster Program	Project for Supporting Industry-University-Institute Collaboration	Project to cope with common difficulties of the companies in a mini cluster	Network vitalization
	Customized Specialization Project	Differentiated projects by the stages of agencies	Productivity increase
	R&D Capability Enhancement Project	Strengthening agency R&D infrastructure and capability	Securing the basis for sustainable growth
Other Program	Connection with policy projects	Projects connected with other policies	Building self supporting basis for clusters

(From: "The Cluster Academy," KICOX. April 2010)

The Project for Supporting Industry-University-Institute Collaboration aims at vitalizing networks and provides support in the form of experts, universities, research institutes, and supporting organizational alliances to enable companies in the region to cope with difficulties in management and technology.

Customized Specialization Project provides assistance in the improvement of R&D as well as purchase, production, and logistics process in order to

increase productivity. Each agency promotes different projects, but they all focus on reducing lead time and improving quality in production.

R&D Capability Reinforcement Projects helps some complexes that are in urgent need for improving their R&D capability, to secure R&D centers and equipment. The project promotes joint R&D of industry-university-institute.

Agro-Industrial Cluster Project supports the vitalization of industry-university-institute network in agro-industrial complexes nationwide.

Finally, in order to build infrastructure and to provide common support for the main programs, several common projects have been carried on, including establishing an evaluation and management system, promoting international collaboration, and building up an online project management system.

[Major programs and Budget by Year]

(Unit: million dollars)						
Major programs	2005	2006	2007	2008	2009	Total
Building industry-university-institute network - Operating small size industry-university-institute alliance(mini cluster) - Supporting projects to cope with company difficulties, agency operation	21.3	29.6	23.7	32.1	38.3	145.0
Customized Specialization Program	2.9	2.7	12.2	20.9	14.8	53.5
R&D Capability Enhancement Program	-	-	9.4	9.4	-	18.8
parceling Out Gunjang Complex into Small Lots	-	6.1	6.1	-	-	12.2
Joint Projects(evaluation management, e-cluster, international collaboration, etc.)	1.6	1.9	1.8	2.2	1.9	9.4
Agro-industrial cluster	-	-	-	4.9	4.9	9.8
Sum	25.8	40.3	53.2	69.5	59.9	248.7

*One dollar is equivalent to 1,150 Won, the exchange rate of September 2010

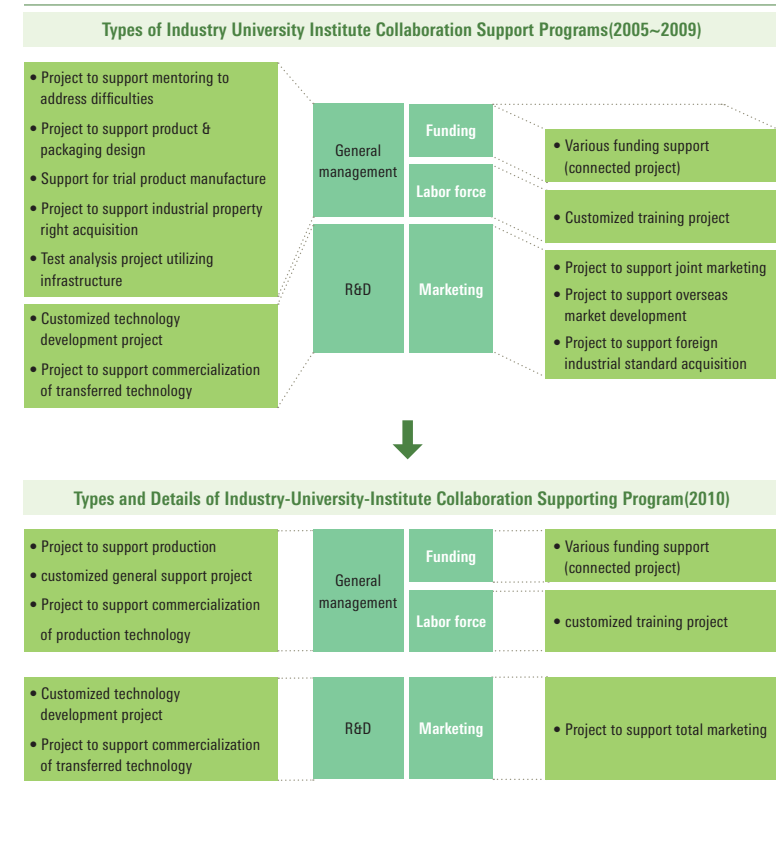
(From: "The Performance Report on 5th(2009) Projects," KICOX May 2010)

The project for Supporting Industry-University-Institute Collaboration has been building up a foundation for a network by identifying and helping to deal with difficulties of companies with mini clusters at the center. The program has offered intensive support to field projects in various areas, including general management, R&D, funding, labor force, and marketing.

The project has provided financial support as well as consultation with experts in related fields, in order to enhance the competitiveness of companies and help them cope with problems that they face in various areas such as management, technology development, funding, labor force and marketing. It especially stressed enhancing the capability of the companies within clusters in technology development and marketing, the areas in which most companies were relatively weak. Some of the main projects supported so far were the Customized Technology Development Project and the Project to Support Transferred Technology Commercialization(R&D), and the Project to Support Joint Marketing, the Project to Support Overseas Market Development, and the Project to Support Foreign Industrial Standard Acquisition(marketing).

Other projects implemented focused on general management such as business strategy planning, business risk management, industrial property right acquisition, and improvement of various processes. Projects to support necessary funding were also provided.

[Types and Details of Industry-University-Institute Collaboration Supporting Program]



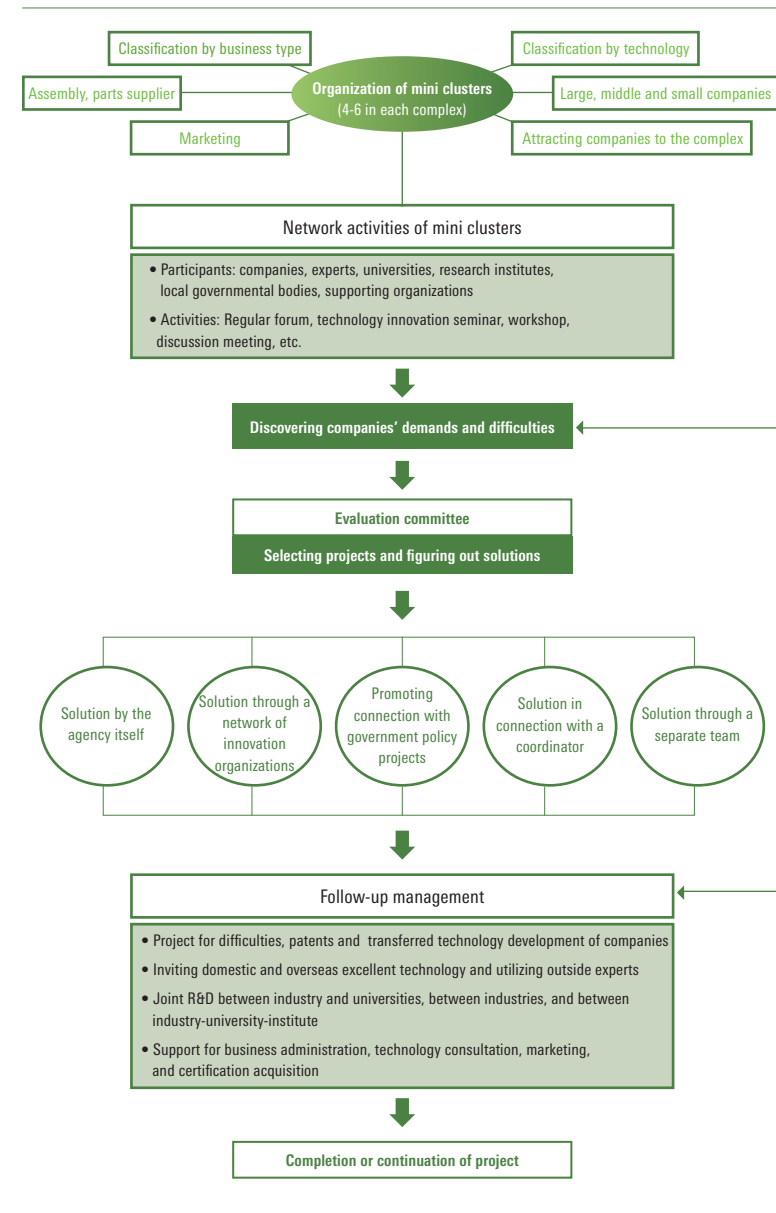
(4) Implementation Process

The Industrial Complex Cluster Program was launched based on the policy made by the Ministry of Knowledge and Economy in compliance with the government's extended regional development policy. And, the KICOX has been

in charge of its implementation.

In terms of the promotion process, the program is unique in that it promotes projects through a consumer-customized bottom-up approach instead of the usual top-down manner where projects have been selected through public contests. In other words, the ICCP has been discovering difficulties of the resident companies in industrial complexes who are the real customers of the government policy through the activities of the small-sized industry-university-institute alliances(mini-clusters), turning the difficulties into projects, and supporting them with constant evaluation.

[The process of Industrial Complex Cluster Program]



(5) Supporting and Managing Infrastructure

To promote the ICCP, it is imperative that various information and know-how be shared, including the current status of each complex, organization and project management, and other data necessary for the support of business administration. In addition, to manage them efficiently, information technology should be utilized.

e-Cluster has been built to promote the Program more successfully. e-Cluster is an integrated online network equipped with the function of real time communication between industries, universities and research institutes.

e-Cluster manages information on industrial complexes and their regions as well as technical data on industries, universities, and research institutes, and other business-related databases on funding and tax. The website also includes information on mini cluster activities and company promotion materials. The Cluster Management System(CMS) built in e-Cluster manages the performance and outcome of the entirety of mini cluster activities, including membership, networking, project application status, etc. Its original model was certified by International Standard Organization(ISO 9001) and registered as business model patent in Korea(Dec. 2007).

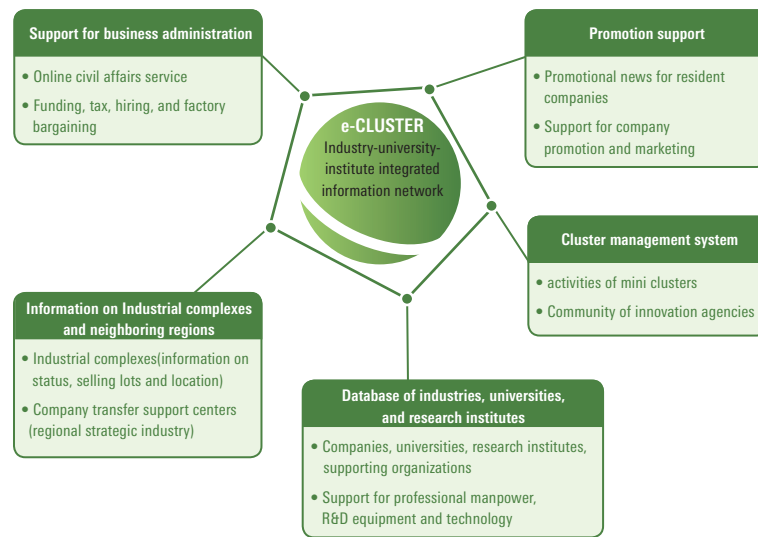
Meanwhile, with the increase of smart phones and various communication channels taking advantage of SNS, such as Twitter, Facebook, or blogs, the varied and useful information of e-Cluster is to be offered on various platforms like smart phones also.

[Main page of e-Cluster System]

(<http://www.e-cluster.net>)



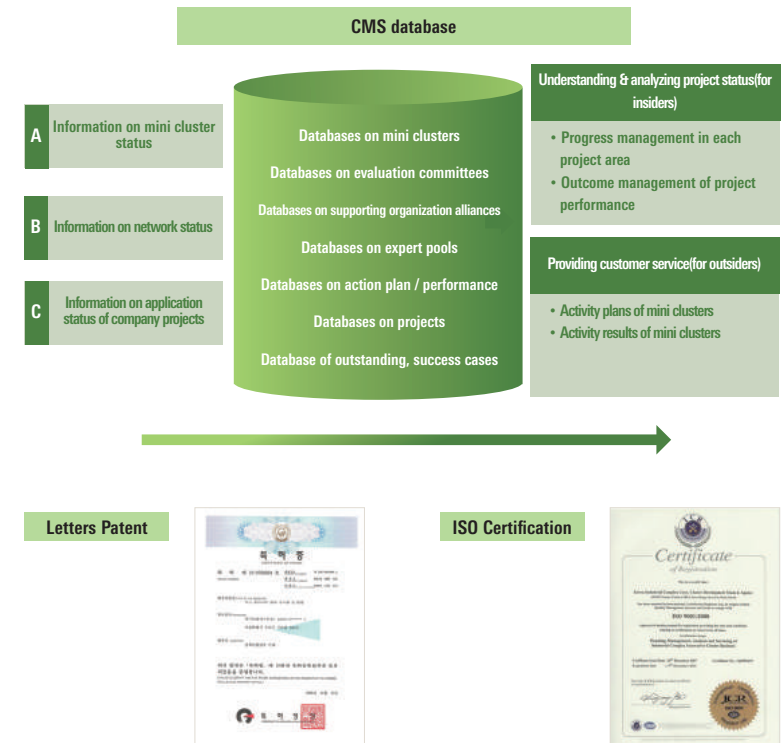
[Function of e-Cluster]



(From: "Industrial Cluster Academy," KICOX. April 2010)

Within the CMS, there is a database to manage comprehensive information on the projects that are currently being promoted. The DB provides detailed information on the goals, strategies, main projects, progress, and outcome of each program, making it useful for policy makers or program agencies. Especially outstanding success stories shared through e-Cluster can be used as reference material for similar projects. In addition, it encourages users to share and improve innovation capability on a regular basis.

[Main Features of CMS]



(6) Outcome Management and Feedback

The Industrial Complex Cluster Program of Korea (ICCP) is a major national program with several different objectives: developing the whole nation with balance, enhancing regional community competitiveness, and improving technology and financial performance. It is very important to check whether the Program is always implemented in connection with these objectives and systematically evaluate whether the Program is achieving its goals or not.

Since the start of the Program in 2005, indexes for systematic evaluation have been created based on annual strategies, main points, and major interests of the Program, and each agency has been evaluated with these indexes.

In 2006, during an early stage of the Program, each cluster was evaluated with four indexes: general plan and its effect, outcome, specialized program, and policy satisfaction. Of these four indexes, the evaluation of the general plan and its effect was carried out in terms of the performance and the level of contribution to local communities. Evaluation of the specialized program was made in respect to the outcome of individual projects of each agency. Comparing the performance and outcome of each industrial complex was made possible by applying common indexes to every complex including building infrastructure for the program, activities and results of mini clusters, discovering outcome and providing follow-up management, and management of project funds.

In 2007, evaluation was made by dividing existing indexes according to the stage of the Program: planning, implementation, outcome, and outcome diffusion. Also, separate indexes were made for assessing projects promoted in

that year including customized specialization project, the project for enhancing R&D capability, the network building project, and the network activity project.

In 2008, existing indexes were substantially simplified and organized into an outcome index system, and measuring indexes were introduced to help objective measurement. For example, measurable and predictable indexes such as patent application or registration numbers, sales figures of newly launched businesses, increase of investment in R&D, and network activity output were introduced, which made it possible to arrive at a more reasonable measurement and more objective comparison of the projects.

In 2009, while existing detailed indexes were still being used based on four stages of the Program: planning, implementation, consequence, and follow-up activities, which enabled each project to be evaluated in relation to the progress of the Program. Also, improving the effects of the Program on a regular basis was made possible with the help of data from continuous monitoring of customer satisfaction.

[Changes in Evaluation Index System(Main Features)]

Type		2006	2007	2008	2009
Evaluating principle		Early stage of the project: Evaluated mainly by quantitative growth indexes (e.g. numbers of mini cluster members)		Stabilized stage of the Program: Qualitative performance indexes strengthened (e.g. achievement of goals)	
Evaluation Index	Planning	Pertinency to plans Connectivity of policies	Pertinency to plans Pertinency to goals	Feasibility of program goals	Feasibility of project goals and contents
	Process	Activities and outcome of mini clusters Capability of agencies Discovering and managing outcome	Pertinency to plans Pertinency to procedure Network efficiency Diffusing outcome Building up networks Activities and outcome of mini clusters	Reasonability of promotion system Suitability of project management Relevance to complex's characteristics MC activities	Pertinency to promotion system Pertinency to projects' characteristics Pertinency to performance management
	Results	Company growth Complex growth	Achievement of goal Company growth Complex growth	Patent application or registration Engineering fee payment Commercialization success amount Contribution to production, exports, employment Contribution to R&D investment	Achievement of goal Technological outcome Financial outcome Contribution to industries

Meanwhile, since pan regional clusters were promoted and organized in 2010, existing evaluation indexes have been modified substantially. The new indexes are evaluation of MCs, indexes in each pan regional headquarters, and customer satisfaction.

The revised index system is distinctive in that its stress is on building and operating business models fit for each mini cluster. This change reflects the idea that the innovation capability of mini clusters lies at the core of the

outcome of pan regional clusters as the composition and activities of mini clusters were expanded into pan regions with the structuring of pan regional clusters. Also, previous indexes of the Program have been divided into two parts: common indexes and headquarters indexes. They, in turn, have been systemized into qualitative and quantitative indexes, making evaluation by pan regional headquarters possible.

Also allowing participant companies, research institutes, universities, and experts to express their opinions freely, has made it possible to discover potential difficulties or produce creative ideas in the course of the program.

[Indexes and Weights of Pan Regional Cluster Evaluation(2010)]

Critia	Evaluation Targets		Evaluation agent	Weight
1. Evaluating MC	Building and operating business models fit for each MC (Average of evaluation results in each pan regional headquarters)		Central Evaluation Committee	40%
2. Evaluating indexes by pan regional headquarters	Evaluating index nature	Evaluating difficulty level and challenging spirit in relation to the result	Central Evaluation Committee	10%
	Common/ Headquarters Indexes	- Common : promotion, budget execution, etc		20%
		- Headquarters : result indexes (qualitative/quantitative) + performance indexes(quantitative)		20%
3. Evaluating Customer Satisfaction	Satisfaction of participants(experts including companies, associated organizations), Effectiveness of strategies of pan regional headquarters and result indexes		Policy head-quarters	10%

3.3 Activities and performance

(1) Building Up and Operating Mini Clusters

Mini Clusters(MCs) refer to small size alliances of large, medium and small size companies, universities, research institutes, supporting organizations, and local governments, grouped by the types of strategic business or technological characteristics. For example, Changwon cluster, which has adopted machinery as its strategic business, has composed and operated mini clusters that specialize in machine tools, molds, transportation equipment, mechatronics, and metal materials.

Mini clusters have played a big part in the implementation of the Program(ICCP). An active industry-university-institute collaboration has been encouraged, and various difficulties in technologies have been addressed in connection with the pool of experts. Also, supporting activities were held to share technologies and information between innovation agents.

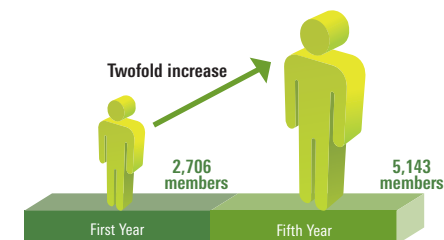
[Status of Mini Clusters in Each Complex]

•3~7 mini clusters grouped by strategic business types of each agency(2005~2009)

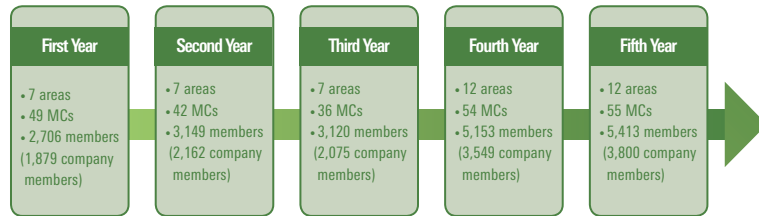
Changwon(5)	Gumi(6)	Ulsan(4)	Banwol-Sihwa(7)	Gwangju(5)	Wonju(4)
machine industry	electronics industry	automobile industry	parts and material industry	photonics industry	medical equipment industry
machine tools, molds, transportation equipment, mechatronics, metal materials	power displays, parts materials, molds, mobiles, E&H, IT, fusion textile, IT equipments	engine modules, power trains, car bodies, car sashes, design modules	synthetic chemistry, textile materials, automobile parts, electric and electronics, clean plates, molds & materials, mechatronics	optical communication parts, optical application, electronic components, molds, automobile parts	traditional medical equipment, electronic medical rehabilitation equipment, medical equipment parts, u-Health
Gunsan(4)	Namdong(5)	Ochang(3)	Seongseo(4)	Noksan(4)	Daebul(3)
machine and automobile	machine parts	electronic information	mechatronics	machinery	shipbuilding
plastics, plasticity, machinery, steel, support for other business types	car parts, information industry parts, industrial machine parts, production base parts, chemical industry	semiconductors, electronic materials, electric & electronics	IT electric & electronics, machine & steel materials, traditional industry convergence, smart automobiles	shipbuilding apparatus, new technology fusion plating, parts & materials, transportation equipment	medium and small sized shipbuilding, shipbuilding parts and apparatus, leisure boats

(From: "The Performance and Outcome of ICCP," KICOX. July 2010)

The number of mini clusters has increased from 49 in the first year of the Program to 55 as of March 2010. During the same period, the number of participating members soared from 2,706 to 5,413, and the average participants in one mini cluster doubled from 55.2 to 98.4.



[Changes of Mini Clusters]



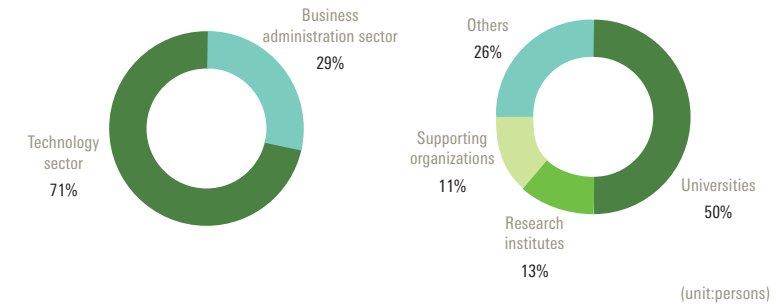
(From: "The Performance and Outcome of ICCP," KICOX, July 2010)

(2) Exchanging Knowledge and Building the Infrastructure

•Operating Industry-University-Institute Expert Pool

To provide support for addressing difficulties, a pool of experts on industry-university-institute collaboration has been working together. It consists of experts in technology or business administration including professors, researchers and company support service personnel. As of 2010, 3,357 experts in technology or business administration are actively engaged in providing support to solve difficulties that companies are facing.

[Pool of Experts on Industry-University-Institute]



Type	University	Institute	Supporting organization	Others	Subtotal
Business administration sector	246	29	188	494	957
Technology sector	1,449	391	177	383	2,400
Total	1,695	420	365	877	3,357

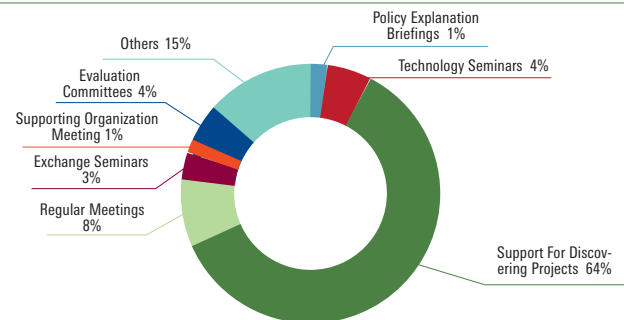
(From: "The Performance and Outcome of the ICCP," KICOX, July 2010)

•Industry-University-Institute Networking

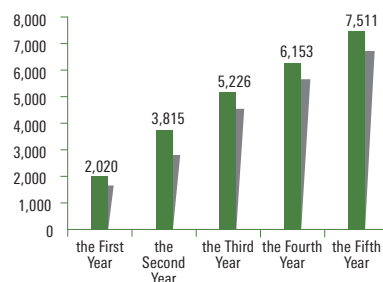
Networking in industrial clusters has been actively going on to provide assistance to companies and supporting organizations and to increase information exchange. The most urgent need of companies is support for discovering new projects, and this constitutes a major part of networking activities. However, networking also includes activities like technology seminars, various joint seminars, and briefing sessions on policies.

Networking increased from 2,020 in 2005(the first year of ICCP) to 7,511 in 2009(the fifth year), and the number of participants also grew by 2.8 times from 23,188 to 65,056 during the same period.

[Types of Network Activities]



[Increase of Activities by year]



(From: "The Performance and Outcome of the ICCP," KICOX. July 2010)

(3) Customized Industry-University-Institute Activities

•Industry-University-Institute Collaboration Support Program

The Industry-University-Institute Collaboration Support Program supports projects discovered by industry-university-institute alliances grouped by business type or technology. In 2005, it supported strategic business groups selected from 7 complexes, and since 2008 it has extended its support to 12 complexes.

The Program has been helpful to solve difficulties in all areas of business administration, including technology development, funding, manpower, and marketing. From 2005 to 2009, assistance was given to 1,968 companies for the purpose of solving 8,234 cases of difficulties. Among these cases, the R&D sector accounted for 922 cases, general business administration 4,282, and marketing 2,746, which shows that the general business administration sector has received a large portion of the support.

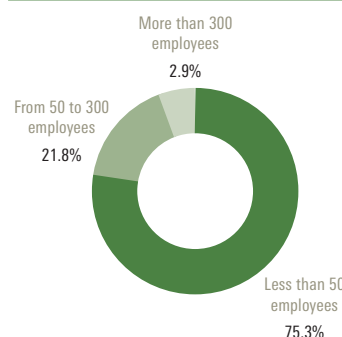
[Application Status by Project Type]

Type	R&D		General business management		Marketing		Personnel		Others		Total	
	Cases	Comp anies	Cases	Comp anies	Cases	Comp anies	Cases	Comp anies	Cases	Comp anies	Cases	Comp anies
ology	172	167	651	465	259	195	17	15	77	74	1,176	514
Second	177	174	635	320	479	303	6	5	48	46	1,345	578
Third	132	129	787	341	484	293	6	5	72	68	1,481	566
Fourth	211	209	1,032	491	649	400	7	4	14	10	1,913	799
Fifth	230	227	1,177	612	875	545	4	2	33	31	2,319	1,019
Sum	922	720	4,282	1,302	2,746	1,040	40	26	244	212	8,234	1,968

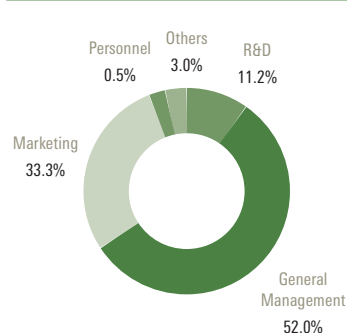
(From: "The Performance and Outcome of the ICCP," KICOX. July 2010)

Companies with less than 300 employees accounted for 97.1% of the support, and 75.3% were companies with less than 50 employees. The result shows that the support was appropriate as most of it was offered to companies which were weak in technology or financial resources and relatively low in their level of management.

[Application Status by Company Size]



[Application Status by Project Type]



[Numbers of Project Application by Company Size]

Company size (numbers of employees)	LESS THAN 50		From 50 to 300		More than 300		Total	
	Cases	Companies	Cases	Companies	Cases	Companies	Cases	Companies
Project application	6,201	1,571	1,797	356	236	41	8,234	1,968

(From: "The Performance and Outcome of the ICCP," KICOX, July 2010)

•Customized Specialization Program

During the early stage of the ICCP, to create the foundation for the program in each complex in a short time, small size industry-university-institute alliances(mini clusters) were organized and the Program was implemented in each cluster with little regard for individual difficulties. At that time, differences in the innovation capability, development type and growth stage of each complex were left out of consideration, which is why it became necessary to customize the programs later.

The customized specialization program promotes specific projects connected with development strategies tailored for each industrial complex. The program is for projects that cannot take advantage of existing

support programs, and is meant to reinforce the innovative technology and competitiveness of each complex and the companies in it. Several projects for invigorating networks, enhancing technology capability, and increasing sales belong to the program.

For the Program, about 44.35 million dollars were granted.

[Performance of Customized Specialization Program]

Year	Number of projects	Government funds (million dollars),
2007(3rd)	29	9.42
2008(4th)	74	20.53
2009(5th)	50	14.39
Total	153	44.34

•Promoting R&D Capability Enhancement Program

To upgrade a production centered industrial complex into a cluster, it is imperative to enhance R&D capability. From the judgment that existing short term projects focusing on solving imminent difficulties had limitation for creating synergy from different policies, the R&D Capability Enhancement Program has been implemented. This program promotes differential reinforcement of R&D capability based on each complex's course or stage of growth.

The Program granted 18.9 million dollars to 5 projects selected in 5 agencies in 2007(the 3rd year of ICCP), and 4.3 million dollars to 13 projects in 12 agencies in 2009(the 5th year).

[Performance of the R&D Capability Enhancement Program]

Type	Projects selected in 2007	Projects selected in 2009
Period	2007.12.1~2009.11.30	2009.3.1~2010.2.28
Budget size (million dollars)	29.74(Governmental spending: 18.9)	5.9(Governmental spending: 4.3)
Number of projects	5 projects	13 projects

(From "Policy Outcome Report on the Program Reinforcing Industrial Agglomeration Competitiveness," Ministry of Knowledge Economy, 2010)

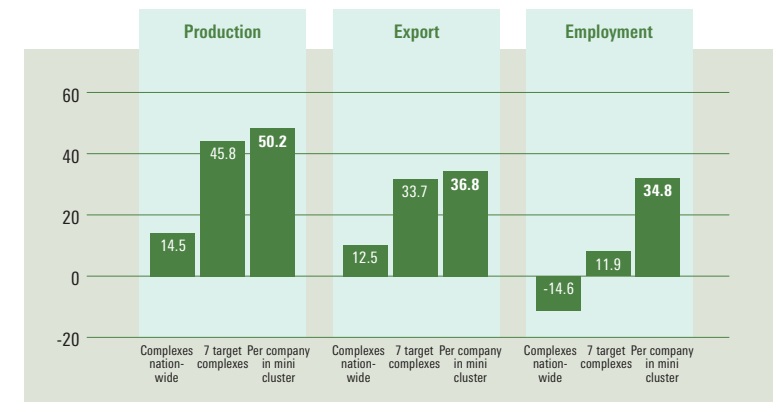
3.4 Outcome of the Program

(1) Summary

•Improving Business Performance

As of 2010, the Industrial Complex Cluster Program of Korea is in the sixth year of its program. So far, it has had remarkable success with the aggressive support of the Korean government and active participation of associated organizations. When the performance of 7 pilot complexes in 2009(the fifth year of the Program) is compared with the performance of the same complexes in 2004(the year before the Program was launched), production increased by 45.8%, exports by 33.7%, and employment by 11.9%, three or four times greater than in other complexes.

[Growth Rate of Industrial Complex Clusters(Year 2009 / 2004)]



(From: "The Performance and Outcome of the ICCP," KICOX. July 2010)

•Achievement of the Program Goals

To decide whether the ICCP achieved its goals, the performance of seven pilot complexes were assessed in production, export and employment. As of 2008(4th year), the Program has exceeded its initial goal, accomplishing 102.1% in production and 105.8% in export.

In terms of employment, it achieved only 94.1% but this data is an indication of higher productivity, as production and trade increased with less manpower.

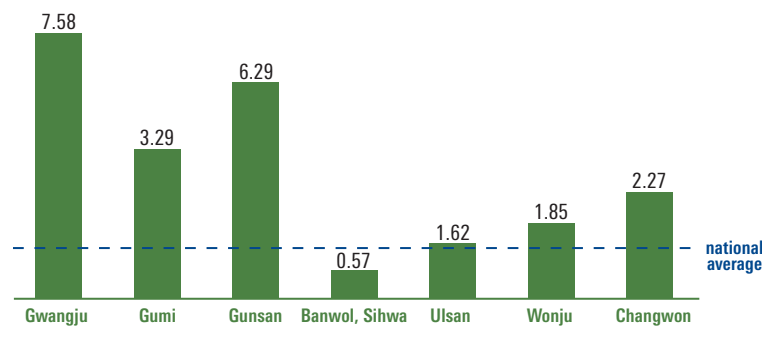
[Goal Achievement 7 Target Complexes of ICCP]

7 Target complexes	Base value('05)	Goal('08)	Achievement	Achievement ratio
Production (billion dollars)	190.4	190.4	258.2	102.1%
Export (billion dollars)	105.8	137	144.9	105.8%
Employment (thousand persons)	442	490	461	94.1%

(From: "The Performance and Outcome of the ICCP," KICOX, July 2010)

In addition, looking into the total factor productivity(ratio of total output over combined input of production factors) of target complexes of ICCP, the increase ratio exceeded the average of manufacturers nationwide. Six complexes showed that they were above the national average of total factor productivity(1.50), and especially Gwangju(7.58) and Gunsan(6.29) boosted their productivity four or five times more than the national average.

[Comparison of Total Factor Productivity of Target Complexes of ICCP]



(From: "The Performance and Outcome of ICCP," KICOX, July 2010)

•Correspondence to the Vision of the Cluster Program

ICCP has the vision of stimulating regional development and reinforcing national competitiveness by upgrading existing industrial complexes into specialized clusters. In the case of seven target complexes, agglomeration has been intensified toward the specialized industries in all of the complexes except Wonju.

This shows that the selection of specialized industries for each region, support of the government, and activities of the constituents in the specific cluster have been carried out efficiently.

[Portion of the Businesses Related to Specialized Industry in the Target Complexes]

Type		Gumi	Ulsan	Changwon	Banwol, Sihwa	Gwangju	Gunsan	Wonju	Total
Specialized sectors		Electronics	Cars	Machinery	Parts & materials	Photonics	Machinery, cars	Medical equipment	-
Share of businesses in specialized industry(%)	2004	55.4	47.7	74.6	63.5	76.5	52.2	69.7	62.8
	2009	66.6	49.7	79.7	71.3	77.2	66.0	63.0	67.6
	Difference	11.2	2.0	5.1	7.8	0.7	13.8	Δ6.7	4.8

•Enhancing Core R&D Capability

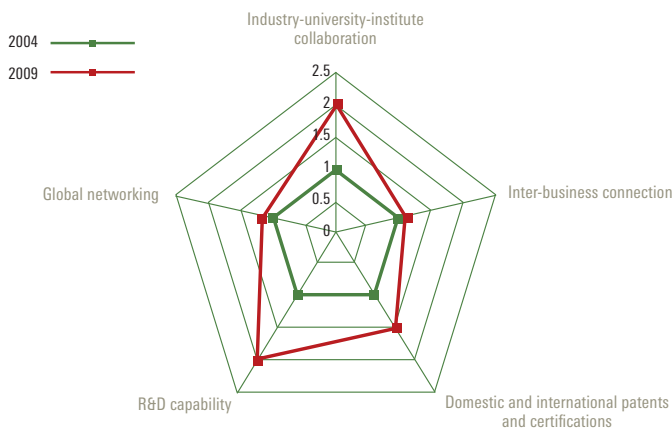
The enhancement of R&D capabilities of the cluster constituents played an important role in the remarkable performance of industrial clusters in production and export.

The companies in the clusters exchanged core technologies and related information through active industry-university- institute collaboration. They also strengthened the R&D capacities that would allow them to commercialize the

technology.

According to a 2010 survey, the level of industry-university-institute collaboration more than doubled, and based on it, R&D capabilities also increased twofold since the beginning of the ICCP.

[Changes in R&D Activities and Capabilities Before and After ICCP]



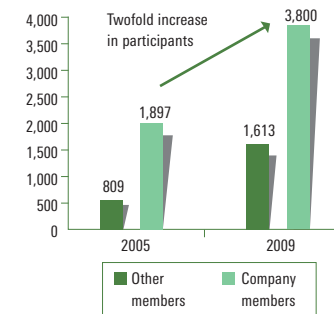
(2) Building Up Networks of Industry-University-Institute

In the process of promoting the Industrial Complex Cluster Program, the primary emphasis in the early stage was on building up self-sufficient industrial ecosystems in each region. With this end in view, small sized industry-university-institute alliances, i.e. mini clusters, were organized in each cluster by business type or technology. Mini clusters are small sized

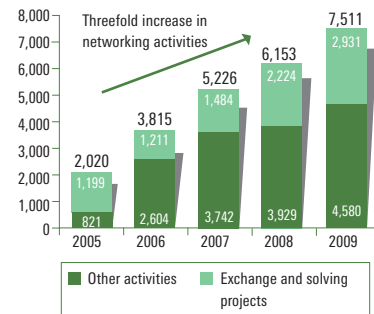
alliances in which various constituents in a complex take part, including large & SMEs, universities, research institutes, supporting organizations, and local governments. They share a range of information on technology or business administration as well as discover new projects and solve difficulties in the process of implementing the Program.

Compared to 2005(the 1st year), networking increased threefold in 2009(the 5th year), and participants doubled during the period.

[Status of Participants]



[Status of Networking Activities]

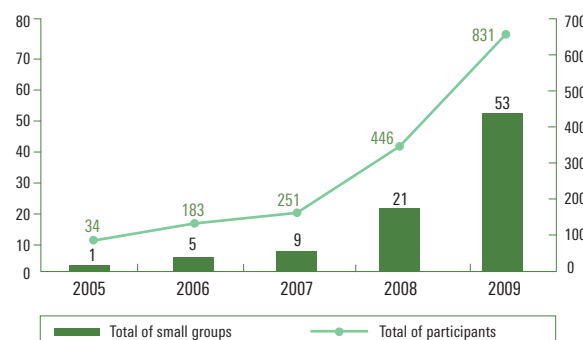


(From: "The Performance and Outcome of the ICCP," KICOX, July 2010)

Especially, as the industry-university-institute networking was promoted consistently and as a result of it, the performance capability was enhanced, the procedure and contents of the networking activities also became specialized and heightened. With the implementation of the Program, participant companies have actively taken part in collaboration with strong solidarity instead of conducting simple exchange. Besides, networking activities are subdivided and organized by the goals of the networking. For example, small

size community activities have increased among the upstream and downstream companies in various business types, and consequently, as of December 2009, 831 members are participating in 53 small size communities.

[Status of Spontaneous Small Size Communities]



(From: "The Performance and Outcome of the ICCP," KICOX, July 2010)

The number of joint collaborative projects by large companies and SMEs has amounted to 57 for the past five years, and technology networking between large, medium and small companies has been expanding.

[Status of R&D Projects with Large Companies]

	2005	2006	2007	2008	2009	Total
Cases	6	5	15	17	14	57

(From: "The Performance and Outcome of the ICCP," KICOX, July 2010)

(3) Enhancement of Innovation Capability Focusing on R&D

The primary factor deciding the competitiveness of a certain company in industrial complexes lies in whether it is in possession of key technology and whether it has the R&D performance capability to commercialize the technology. The Industrial Cluster Project has achieved tangible results in terms of the R&D capability reinforcement in target complexes such as the expansion of industry-university-institute collaboration, strengthening interconnection of companies, and encouraging investment in R&D of individual companies.

Investment in R&D of each company increased from 292.6 thousand dollars in 2004, before the beginning of the Program, to 594 thousand in 2009, making a more than twofold increase. The number of domestic and foreign patent applications and certifications also increased by 138%.

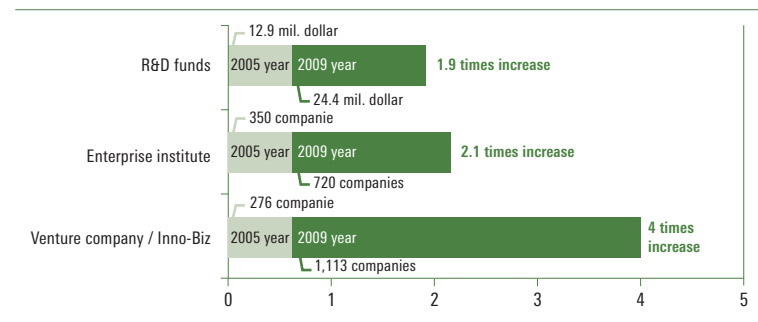
[R&D Improvement of Industrial Clusters]

Type(Average)	2004 (A)	2009 (B)	Difference (B-A)	Variation (B/A)
• Cases of industry-university-institute collaboration(cases / companies)	2.2	4.8	2.5	218%
• Average number of inter-business connection(cases / companies)	2.49	2.93	0.4	118%
• Number of domestic and international patents and certifications(cases / companies)	9.1	12.6	3.5	138%
• R&D funding (thousand dollars / companies)	282.8	582.6	299.8	206%
• Weight of global networking related to purchase and sales(%)	27.7	30.6	2.9	110%

(Data, Research and Research, June 2010)

During the period of the Program, certification for R&D by companies increased, as well as the organization and budget funds for R&D. The numbers of venture or inno-biz companies rose by 4 times, R&D investment funds by 1.9 times, and company research institutes by 2.1 times.

[Status of R&D Capability Index Compared with 2005]



(From: "The Performance and Outcome of ICCP," KICOX, July 2010)

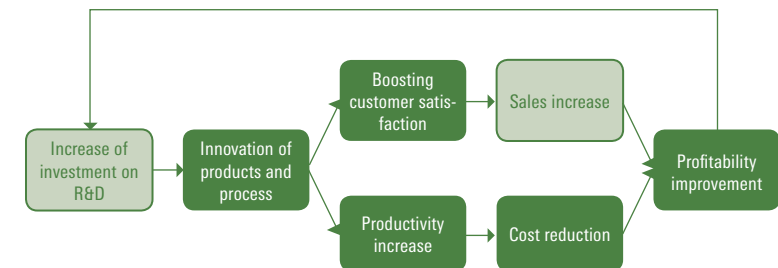
During the same period, projects in the R&D sector amounted to 900 96.5% of which were conducted by industry-university-institute consortium. This indicates that technologies and know-how were actively shared, as most R&D performances were achieved through joint projects between companies or between companies and research institutes.

[Status of R&D Consortium Project Performance Types]

Type	Single Project	Consortium Projects							Total
		Industry-Industry	Industry-Institute	Industry-University	Industry-Industry-Institute	Industry-Industry-University	Industry-University-Institute	Subtotal	
Cases	31	128	169	450	30	82	10	869	900
%	3.5	14.2	18.8	49.9	3.3	9.2	1.1	96.5	100

What is significant is that the result of such R&D performance has actually led to sales increases instead of dying out or being buried as simple underlying technologies. This is possible because the business value of the project is examined in the early stage of R&D, and designing strategies and marketing activities are conducted to boost the marketability of the developed products. In fact, the companies which have participated in the Program, when compared with other companies, are in a virtuous cycle where the increase of R&D funds leads to sales increases.

[Virtuous Cycle of R&D Fund Investment and Sales Increase]



(4) Specializing and Heightening Each Complex

Each industrial cluster in Korea has its own unique development type based on its location and industrialization stage and has different characteristics in its innovation capability and growth stage.

Based on the characteristics of each industrial complex, Gwangju-Wonju complexes have been classified as new industry creating type, Changwon-Gumi-Ulsan as structure heightening type, Banwol-Sihwa as business fusion type, and Gunsan into company inducing type.

The Gwangju and Wonju Clusters are leaders in new industries. As Gwangju concentrated on creating new industries in photonics, it witnessed an increase in photonics companies from 190 in 2004 to 346 in 2009. Wonju, which focuses on medical equipment, accounts for 90.1% of the entire production of medical equipment in the nation, and 14.5% of its exports.

In the case of Changwon, Gumi and Ulsan, clusters which focus on structure heightening, the agglomeration of the specialized industries in the complexes has been continuously increasing. Banwol-Sihwa, a business fusion type cluster, has strengthened the network system between different business types of materials, parts, and bases.

The Gunsan complex, promoted as a company inducing type, achieved remarkable outcome in attracting core leading companies to the complex. The number of resident businesses in the complex increased to 241 in 2009 from 69 in 2004.

[Status of Specialized Clusters by Development stage]

Type	Creating new industry	Heightening structure	Fusing Businesses	Attracting Companies
Complex	Gwangju, Wonju	Changwon, Gumi, Ulsan	Banwol-Sihwa	Gunsan
Strategies and projects	<ul style="list-style-type: none"> Building new business networks Attracting core businesses Founding venture businesses 	<ul style="list-style-type: none"> Concentrating related business types Building connection system of value chain Heightening productivity 	<ul style="list-style-type: none"> Inter-business exchange system Creating fusion companies Building inter-business connection system 	<ul style="list-style-type: none"> Attracting and creating core leading companies Building cooperative networks
Current Status	<ul style="list-style-type: none"> Gwangju: Photonics, Wonju: Medical equipment Growing to become domestic core clusters Gwangju: increasing agglomeration of photonics companies ('04)190→('09)346 Wonju: 90.1% in production, and 14.5% in export of domestic medical equipment 	<ul style="list-style-type: none"> Growing agglomeration of specialized businesses in the complex Gumi 11.2%, Changwon 5.1%, Ulsan 2% Growth('04→'09) 	<ul style="list-style-type: none"> Nurturing the complex as a parts-material cluster Composing 7 MCs in material, 3 in parts, 17 in base 278 members participating in 17 fusion sub-MCs (as of the end of Nov. '09) 	<ul style="list-style-type: none"> Increase in parceling Out Lots of Gunjang Complex 72.2% 23.3%('04)→95.5%('09) Resident companies growing by 172 69('04)→241('09).

(From: "The Performance and Outcome of the ICCP," KICOX, July 2010)

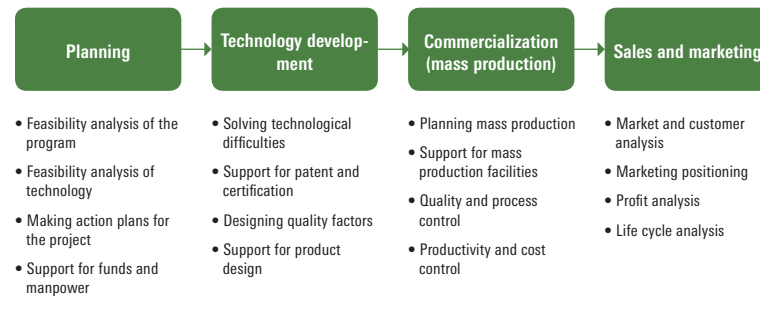
(5) Invigorating SMEs' Business

The Program has done more than just presenting policy projects: it has built a customized supporting system to help companies tackle difficulties in their total life cycle.

SMEs tend to be weak in some or all parts in a business value chain including business planning, technology development, trial product manufacturing, commercialization, patent or certification, design, and marketing. This can lead to bottlenecks in some parts and eventually to

failure of the whole project. In such cases, the program can boost efficiency of business performance by providing timely support to companies when they come across difficulties.

[Support for SMEs in All Stages of Business]



Studies show that the projects supported by the Program achieved higher efficiency compared with other government supported projects: 48.8% of projects that were supported succeeded in commercialization while 39.4% of other government-supported project were successful.

The Program is especially meaningful in that it has encouraged the growth of small or medium sized companies by concentrating support on small companies with less than 50 employees, as they tend to be marginalized in other government projects. Between 2005(the first year) and 2009(the fifth year) 75.3% of assistance offered by ICCP were for small companies. ICCP has also encouraged SMEs to voluntarily participate in various mini cluster activities such as technology seminars, on-the-spot forums, and consulting sessions.

[Support results by company size]

Size of company	Less than 30 employees	Less than 50 employees	Subtotal	Less than 100 employees	Less than 300 employees	More than 300 employees	Total
Number (Percentage)	5,061 (61.5%)	1,140 (13.8%)	6,201 (75.3%)	961 (11.7%)	836 (10.1%)	236 (2.9%)	8,234 (100%)

(From, "Major Performance and Outcome of the ICCP," KICOX July, 2010)

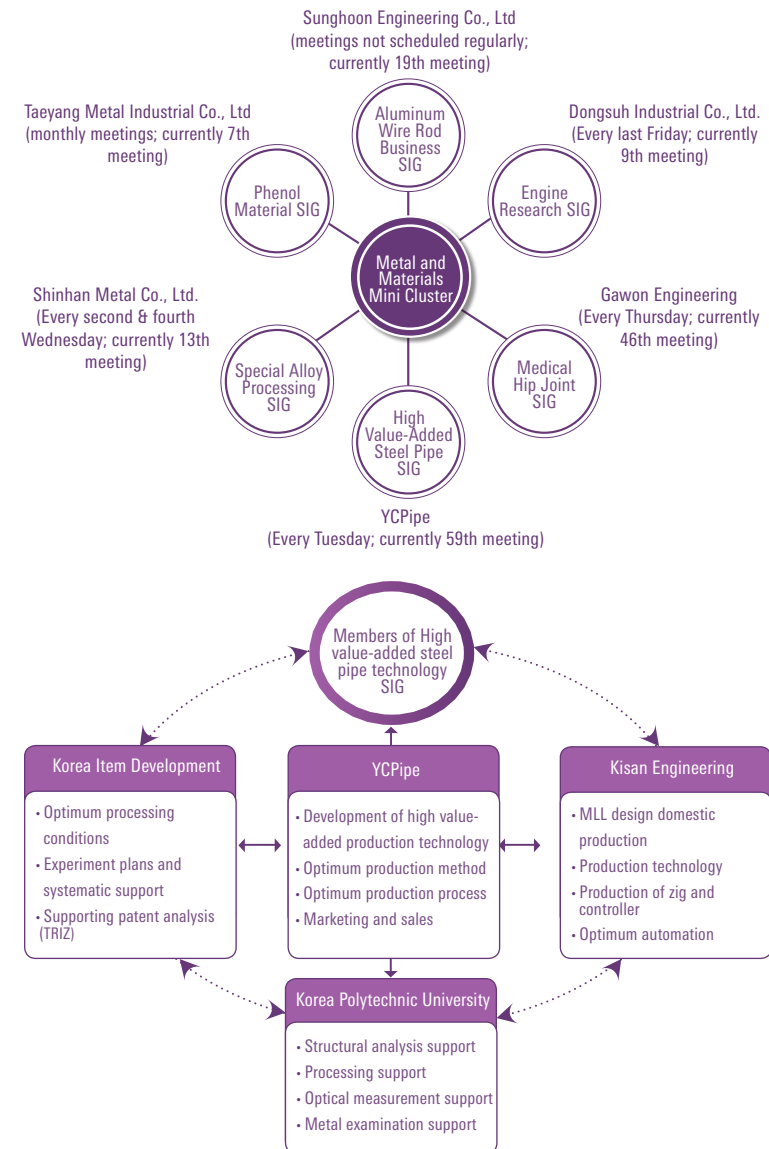
IV. Success Stories

4.1 Enhancement of the networking Activities

(1) Spontaneous Evolution of the Industry-University-Institute Network(Banwol-Sihwa Cluster)

In order to enhance the innovative capacity of the industry-university-institute network and support its continuous growth, it is imperative that organizations within the cluster work together and share information. An important characteristic of Korean industrial clusters is that businesses are grouped into mini-clusters which work together to share expertise and resolve difficulties. Meanwhile, small-size communities called Special Interest Groups(SIG) are formed within each mini-cluster, as the focus of a business within a mini-cluster could be in a specialized field depending on its area of interest or research.

[Organization of SIGs within the Metal and Materials Mini Cluster in the Balwol-Sihwa Agency]



(From: "2009 Progm Report(by Region), KICOX, May 2010)

The Banwol-Sihwa Cluster is an exemplar SIG program that has channeled the spontaneous desires of many companies in the industry to form networks that work toward a common interest. On December 2009, 17 SIGs were organized around leading companies in the industry, with 299 industry-university-institute network members participating in the program.

A special feature of the SIG in Banwol-Sihwa is that businesses in the pan regional value chain gathered to create a pan regional SIG. For example, businesses located in Banwol-Sihwa, Seoul, North Chungcheong and Kyonggi are participating in the medical hip joint SIG with Gawon Engineering at its center. Also, collaboration among SIGs can create synergy. For example, the medical hip joint SIG is working with the Special Alloy SIG to produce better medical implants.

[SIG Program of Banwol-Sihwa Agency]



(From: "2009 Project Evaluation(by Region), KICOX, May 2010)

These SIG's not only exchange technology and provide support for each other but also organize consortiums to promote joint projects for government programs. They also make efforts to upgrade the industry by working together to enter new fields of business that offer higher profits with high value-added products.

The following are some examples of joint participation in government projects: the Special alloy SIG received about 2.6 million dollars for a project to develop tube manufacture technology for high performance hybrid heat exchanger and a project to develop high strength steel plate material; the medical hip joint SIG was awarded 5.2 million dollars in the course of four years to develop senior-friendly next - generation artificial hip joint technology and its core parts.

[Consortiums Participating in Government Programs]

SIG	Technology	Government program	Government grant(period)
Special alloy SIG	Tube manufacture technology for high performance hybrid heat exchanger	Small and Medium Business Administration technology development project	436 thousand dollars
Special alloy SIG	High strength steel plate material	Selected as parts and material technology development project candidate(individual)	2 million dollars(3 years)
Medical hip joint SIG	Technology for developing senior-friendly next generation artificial hip joint and core parts	Selected as parts and material technology development project candidate(group)	5.2 million dollars (4 years)

Special interest groups are attempting to upgrade their industry through joint participation in higher value added businesses. For instance, higher value added steel pipe SIG, which used to focus on simple drawing, has launched into the seamless steel pipe business. Also, Phenol SIG is trying to increase the added value of its products by switching from metal material to polymer material.

[Example of Upgrades to Higher-Value Added Industries]

- Higher value added steel pipe SIG: Simple drawing business upgraded to seamless steel pipe business
- Aluminum wire rod business SIG: Upgraded from manufacturing regular aluminum billets to higher value added aluminum wire rods
- Phenolic resin SIG: Upgraded from metal materials to higher value added polymer materials
- Titanium SIG: Upgraded from copper-based material to titanium composite material
- Special alloy SIG: Joint success of companies focusing on special alloy process technology and companies focusing on cold working technology

The operation of mini clusters, especially the SIGs, in the Banwol-Sihwa complex and information sharing within the complex are considered model cases of networking. For businesses in the complex, an SIG is not merely a place where connections are made and information shared; it is a new business model through which companies can find partners for government programs, launch joint new enterprises, and build a cooperative professional relationship in specialized areas.

[SIG Activities in Banwol-Sihwa Cluster]



(2) Saving Lives: Total Life Cycle Support System(Wonju)

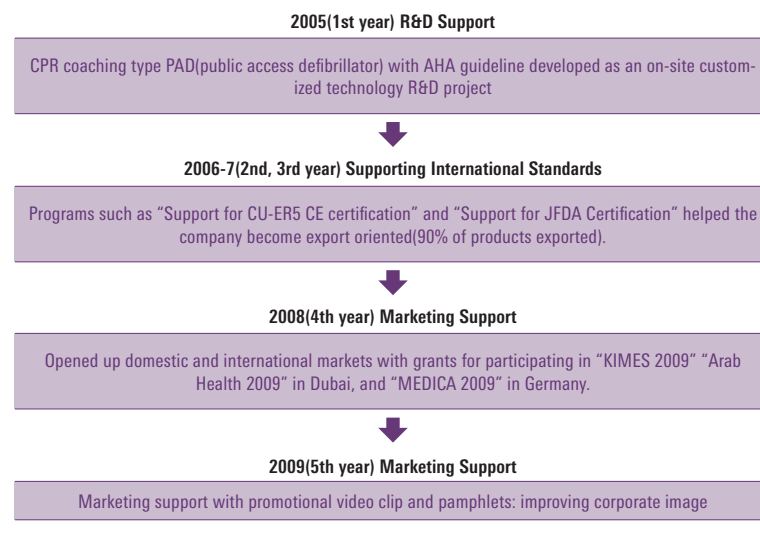
The development of the AED(automated external defibrillator) “Lifesaver” by CU Medical Systems, Inc, a company located in Wonju Industrial Cluster, is an exemplary case of a total life cycle of industry-university-institute collaboration, which includes feasibility study, R&D, marketing, etc.

According to the Korea Society of Emergency Medicine, almost 20,000 patients suffer from cardiac arrest outside hospitals each year, only 1.6% of whom receive CPR at a 2.5% survival rate. Thus, developing “a portable AED

that anyone could use” and placing these devices in public places was the objective of this project.

Total life cycle support was available for this project, including R&D, international standards, marketing, etc. Details are as follows:

[Total Life Cycle Support for Lifesaver]



(From: "2009 program(by Report)", KICOX, May 2010)

After the completion of this project, AEDs were placed in 6 KTX stations and inside the trains. Furthermore, the City of Wonju has plans to spend 170 thousand dollars to supply 50 more AEDs in places like bus terminals, Wonju Sports Center, schools, social welfare facilities, public health centers and clinics.

Public awareness that non-specialists can save emergency patients has

been growing since the media coverage of an incident in which a "Lifesaver" was used to save a precious life in an emergency situation during a city soccer game.

[Media Coverage: Wonju's Lifesaver, AED]



"AED equipped at Incheon National Airport" kimyi@yna.co.kr

(Wonju, AP) The high-tech medical equipment AED that the City of Wonju has been placing in public places has saved a life in an emergency situation.

Lee Chang Hwan(36), a city employee working at Wonju Sports Complex, found a Mr. Lee(62, Hwongsung) who had suffered a heart attack during a club soccer game, and saved his life by using the AED immediately.

The public servant, noticing that the patient was in a state of cardiac arrest, unconscious, not breathing and without a pulse, was able to save him by administering CPR with the AED while others were dialing 119.

"The AED in the sports complex played a big role in saving the patient, since the paramedics did not bring the necessary equipment for CPR," said Lee. He also added that he heard from the paramedics that the patient might not have survived if CPR had been delayed.

The City of Wonju has placed 2 AEDs in Wonju Sports Complex, 13 in public spaces such as City Hall, health centers, and Wonju Station. AEDs will also be installed in the newly opened Wonju Bus Terminal and Wonju Sports Center in the near future.

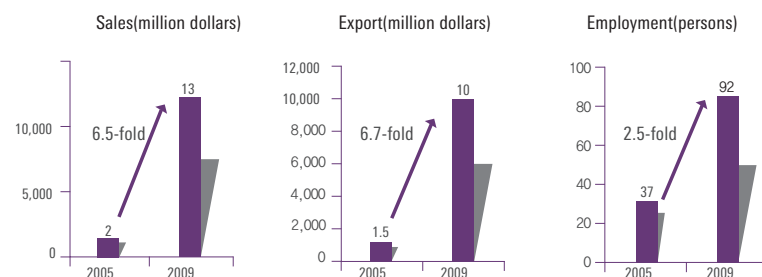
The city is pushing to have the medical equipment installed in other institutes and organizations. A budget of 170 thousand dollars has been secured for this purpose. The city plans to supply 50 AEDs in schools, social welfare facilities, health centers and clinics.

"We plan to supply the high-tech medical equipment AED, which is manufactured by a local medical equipment company, to public facilities in order to save emergency patients who need immediate CPR," said an official from City Hall.

As a result of this project, CU Medical Systems successfully commercialized core technology for manufacturing defibrillators, and had a remarkable increase in both domestic sales and exports.

Compared to 2005, 2009 showed a 6.5-fold increase in sales and a 6.7-fold increase in exports. Also, more jobs were created, with the number of employees increasing from 37 to 92.

[Major Outcome of the New Product]



(From: "2009 Project Evaluation(by Region)", KICOX, May 2010)

Many SMEs have core ideas but lack planning, commercialization, or marketing capabilities. This is considered a successful project in that a new business opportunity was discovered in a changing business atmosphere, and total life cycle support was offered, including feasibility study, R&D, and marketing.

This was a case showing that a core idea can be a starting point for developing and selling a product and achieving financial success. Potential entrepreneurs with creative ideas should learn from the success of this project.

(3) Hidden Champion Company Project(Seongseo)

Presently, there are many companies that, while not as well-known as Microsoft, HP, or Samsung, possess core technologies and products and have the highest or second highest market share. These companies are called "hidden champions"(small but strong companies). It is estimated that around 30 hidden champions exist in Korea, and they all have one common trait: their technological innovation capability.

Daegu-Seongseo Cluster promoted a project to support hidden champion companies by diagnosing the technological innovation capability of member companies. The main focus of the project is: to analyze in detail and diagnose the technology level of member companies; to derive a technology development road map for setting mid-to-long-term strategies for each company; to diagnose and analyze copyrights for the core technology possessed by the company; and to provide information regarding mechatronics.

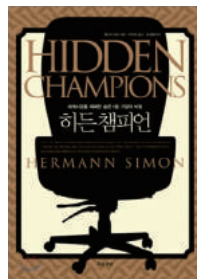
The technology and patents of 40 member companies were diagnosed and analyzed. On-site diagnosis and interviews were conducted to diagnose level of technology and customized analysis was offered to identify future business items. In the end, a technology development road map was given to each company.

This project, which was promoted from August 2009 to April 2010, was supervised by Korea Institute of Industrial Technology.

The mid-to-long-term strategic technology road map of each company will be utilized to set the strategic objective of Seongseo Cluster. Companies can also use the road map to develop new products or strengthen their

technology development capacities. They will be able to strengthen their core competence with a concrete vision for the future. When the project is complete, member companies will have a concrete and detailed plan that will help them grow into global hidden champions.

[Hidden Champion Rearing in Seongseo Cluster]



Hidden Champion. If I can't do it, no one can.

Choose, and then concentrate.

A new innovation for each day.

The global market is my target.

Put yourself in the customer's shoes.

Become undefeatable.

4.2 Integration of Innovation activities across pan Regions

(1) Discovering Pan Regional R&D Projects and Providing Support(Changwon)

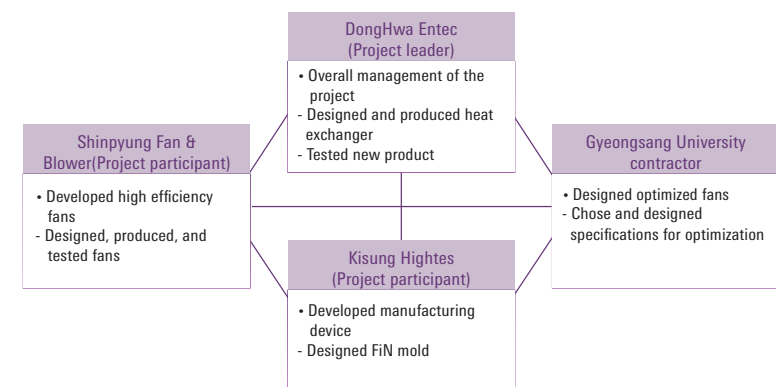
The Dongnam Region, which includes Changwon, Ulsan, and nearby areas, has taken on the role of parts supplier. The industries that are the leaders

of growth in the Dongnam region, "green transportation system" and "high-tech machine parts and materials," will be receiving full support. Thus, companies in Changwon Cluster recognized the need to be prepared to strengthen their capacity to develop convergence components and materials.

Noksan Complex, where the project's leader, DongHwa Entec, is located, houses many companies specializing in marine equipment. In order to integrate automation technology and a new mold for radiator FiN, which affects the quality of the radiator, the project was jointly carried on with a company specializing in radiator molds.

DongHwa Entec supervised the program and has overseen the design, production, and evaluation of the heat exchanger. Other companies that participated in the project are Kisung Highest Co., which worked on designing and producing FiN die, and Shinpung Fan & Blower, which developed high-efficiency fans. Gyeongsang University collaborated in the project, providing technical support to optimize the design of the fans.

[Project Promotion System]



This project, funded by the Changwon and Noksan Agencies, started in August 2009 and continued till June 2010. As a result of this project, import of the machinery will be considerably reduced: the newly developed heat exchanger is expected to be used in place of over 1,000 heat exchangers that would have been imported. In three years, it is estimated that sales will increase over 34.8 million dollars. Furthermore, the competitiveness of related industry has been strengthened by the development of core parts for power plants.

This was a successful R&D case made possible by collaboration between Changwon and Noksan complexes. Another successful aspect of the project is that it advertised the positive effects of pan regional R&D.

[Pan Regional R&D Project in Changwon Cluster]



Heat exchanger developed by DongHwa Entec

Meeting to promote the project

(2) Development of Next Generation Technology through Core Technology Fusion(Ochang)

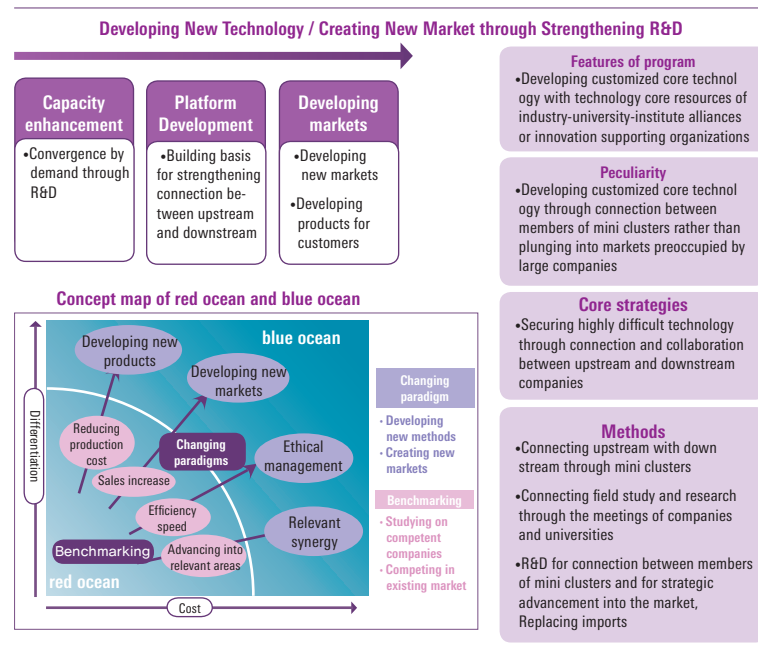
With the recent popularity of smart phones such as the iPhone, demand for high value indium tin oxide(ITO) film has been soaring worldwide. Although there has been continuous demand from domestic and foreign buyers, Korean companies had difficulty developing and producing these products because of the lack of equipment and original technology.

SurfaceTech, which is located in Ochang Cluster, has been producing ITO films widely used for car navigation systems with RTR equipment using the resistance film method. SurfaceTech decided to upgrade their technology to produce highly demanded high-transparency ITO film in Korea using transparent electrodes, which are durable and have high optical characteristics.

From March 2009 to March 2010, SurfaceTech collaborated with the University of Cheongju and other companies that have relevant technology to carry out a fusion technology development project called “Development of High Function Electrode for FPD and Technology for Producing Transparent Film Material in Korea.”

Details of the project were as follows: selecting under-coating target material; understanding optical characteristics by performing optical simulations; setting optimal conditions for differences in the thickness of films; research on improving adhesive force; evaluation through test products; field test and evaluation; plans for commercialization; and finally, mass production. Although the project lasted only for a year, it was very successful.

[Strategies of the Project]



Through this project, SurfaceTech was able to obtain the technology for mass production of capacitive high transparency index matching ITO film usable for cellular phones. Currently, production of high transparency ITO film is monopolized by Japan, but when mass production starts in Korea with large area RTR sputter, importation of high-transparency ITO film will be considerably reduced. Also, strategic collaboration with Korean TSP industry can lead to heightening the competitiveness of the display industry. With the success of this project, 3.47 million dollars are expected to be saved in 2010, and 9.34 million in 2011. By the year 2011, 25 more jobs will have been created in the company.

ITO film technology developed in Ochang Cluster is a successful case of

adapting to the changing market. By creating synergy among core technologies owned by Korean companies, such as mobile and display, SurfaceTech was able to attain international competitiveness in a next-generation device(touch fusion product) that could create added value.

4.3 Improvement of Global Competence

(1) Winning Overseas Contracts through Joint Marketing(Gwangju)

Gwangju Industrial Cluster specializes in the optical electronics industry. In order to collaborate on targeting overseas markets, they first worked on establishing a firm foothold for marketing and supporting customized joint marketing.

In 2008, a group consisting of KICOX, company representatives, and professionals worked together to create an English catalogue for the optical electronics industry. Also, the technology and various products of the Gwangju optical electronics industry were publicized to overseas buyers in an effort to establish a base for marketing.

An instance of successful collaboration was winning a contract from an Australian buyer by collaborating with Pho-Me, a company that has a foothold in the Australian market.

[Sales Increase and New Jobs]

Participating companies	Pho-Me Corp.		Human Light Corp.		Luxcom Corp.		Sum	
	Sales	Em- p- loy- ment	Sales	Em- p- loy- ment	Sales	Em- p- loy- ment	Sales	Em- p- loy- ment
Increase(Million dollars / persons)	0.97	5	0.2	3	1.95	9	3,2	17

(From: "2009 Project Evaluation(by Region), KICOX, May 2010)

Further synergy was generated during the course of the project by collaborating with partner companies from other clusters to meet the needs of buyers.

[Collaboration with Partner Companies]

- East Photonics(Daejeon) : CWDM Power-Meter, DWDM Power-Meter
- JS Trading Co.(Seoul Metro Region) : SFP Transceiver, 6Ch CWDM Module
- Opteron, PPI, IS Tech(Gwangju) : PLC Splitter(1*4, 1*8, 1*16, 1*32), WIC Coupler

(Note) CWDM : Coarse Wavelength Division Multiplexing

DWDM : Dense Wavelength Division Multiplexing

[Global activities in Gwangju Cluster]



A Mini Cluster for optical fiber communication parts



Buyers meeting with Pho-Me(Photonics Mediate) CO., LTD.

(2) Marketing Support to Increase Export of Marine Equipment Industry(Noksan)

With 60% of marine equipment companies concentrated in the Busan area(mostly Noksan), the marine equipment industry has played a vital role in the economic prosperity of Busan. However, the marine equipment industry is facing a crisis because of a significant decrease in orders for shipbuilding since the recession following the financial crisis. This project was planned as a means to tackle this problem.

The project focuses on supporting multilateral overseas marketing so that equipment companies will be able to advance into overseas markets and trade directly with foreign buyers instead of relying on major domestic shipbuilders.

The project focused on strategic and realistic marketing plans to open up foreign markets in cooperation with KOTRA, BMEA(Busan Marine Equipment Association), and overseas organizations. A report was written on the current state of the marine equipment market in Brazil and Vietnam, and agents were sent to Japan and Europe. This resulted in 206 business meetings and 47 million dollars' worth of contracts.

Meanwhile, as part of the project, specialized exhibits were held both in Korea and overseas, and exhibition centers are being operated. The project team participated in three overseas exhibits, including one in Vietnam, which resulted in 283 cases of business meetings and 43 million dollars' worth of contracts.

[Major Achievements of the Project]

Strategic and realistic marketing	<ul style="list-style-type: none"> Strategies for market research and marketing, Consultation for selecting products for export, Finding buyers Partner Organizations: KOTRA, BMEA, overseas organizations
Research on overseas markets and marketing agents	<ul style="list-style-type: none"> Report on the current state of the marine equipment market and trade barriers in Brazil and Vietnam Marketing agents sent to 5 countries, including Japan and European countries; 206 cases of business meetings, 47 million dollars' worth of contracts
Joint exhibits in Korea and overseas	<ul style="list-style-type: none"> 37 companies participated in 3 exhibits, including Vietship 2010; 283 business meetings, 43 million dollars' worth of contracts
Buyer meetings with overseas buyers with purchasing power	<ul style="list-style-type: none"> Meeting with Dutch shipbuilders and 9 marine equipment companies(82 companies from Noksan participated) Major achievements: 114 business meetings, amounting to 165 million dollars(one third of costs cut, 6-fold increase of participating companies)

(From: "2009 Program Report(by Region)", KICOX, May 2010)

The biggest achievement of this project is that a network connecting the companies to overseas organizations was set up. MOUs were signed with SINAVAL and VINASHIN to enable information sharing and joint projects.

In the course of this project, 3 companies within Noksan Complex were registered as partner companies of Petrovros, a company ranking 4th in the world in the industry. This shows that the project has made Noksan Complex and the Korean marine equipment industry better known throughout the world.

(3) Consortium for Mid-size Company Global Strategic Items(Gumi)

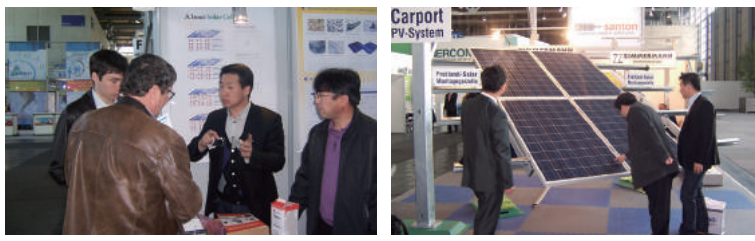
Gumi Cluster runs a mini cluster that has selected electronics as its strategic industry, including power displays, parts and materials, mobiles, IT fusion fibers, and IT equipment. This cluster felt a pressing need for strategic marketing and a secure sales network for global strategic items of mid-size companies.

The objective of this project was to have companies participate in the form of a consortium and work together on market research, marketing and promotion, and expansion of overseas markets instead of tackling these problems alone.

The project encompasses various aspects of business: research of the target market, overseas marketing, establishing infrastructure for trade, and trade consulting. It also plans to hold seminars and exhibits, business tours, and buyer fairs.

This project will be operated for five years starting in 2010. The program is run for first year by the Small and Medium Business Administration with support from Korea Federation of Small and Medium Businesses from January 2010 to December 2010. As a result of this project, it is expected that marketing costs will decrease and exports increase.

[Consortium in Gumi Cluster]



Participation in Fusion and Convergence Exhibit

IT equipment inspection

4.4 Reinforcement of the inter-organizational collaboration

(1) R&D Projects and Collaboration among Businesses (Banwol-Sihwa)

As ideas and core technology are owned not only by universities and research centers but also by companies, joint R&D and collaboration between companies is also possible. Bawol-Sihwa had a successful case of one such collaboration.

Founded in 1984, NS Autotech, a company working with the Banwol-Sihwa Cluster, produces auto parts. A member of an auto parts mini cluster, this company has been active in promoting cooperation among businesses and emphasizing the need for R&D. In the Korean auto industry, a steel mold or

casting mold is used to produce aluminum sheets, but the product is lacking in quality, and productivity is low. NS Autotech tried to solve these problems and optimize productivity with deep-draw technology that uses a plastic mold.

Core technology was needed to design and build the mold for this project, which is why NSAT was included in the project. In the course of collaboration with partner companies, NSAT discovered a possibility to have this technology transferred to Korea from overseas companies and to develop this breakthrough technology in Korea.

This project continued from July 2009 to June 2010, and was completed after developing aluminum heat shields for automobiles and deep-draw molding technology. This project was successful in producing lighter auto parts, which can raise fuel efficiency. This will enhance customer satisfaction and upgrade the industry, potentially opening up new markets. Also, as aluminum heat shields currently being imported can now be manufactured in Korea, a sum of 4.3 million dollars no longer needs to be paid to foreign manufacturers. If this technology strengthens its global competitiveness and starts exporting its products, it will be beneficial not only to the industry but to the Korean economy in general.

This case of collaboration within the industry shows that collaboration in R&D need not be limited to industry-university or industry-research institute. It demonstrates the need to strengthen the network among companies and encourage active information sharing.

(2) Mentoring for Problem Solution(Gunsan)

Businesses face difficulties in many areas including management, R&D, marketing, and capital. If a specialist could offer timely customized guidance, companies would solve these problems in a short time and business will not be interrupted. Customized support to get SQ certification promoted by Gunsan Cluster is an excellent case of business problem solving.

DY Engineering, affiliated with a mini cluster, needed SQ certification required by major auto companies such as Hyundai and Kia. However, not having a specialist who could tackle this problem within the company, the company turned its eyes to outside specialists for customized consulting.

For 2 months starting in July 2009, AB&S, a specialist in that area, provided customized consulting for SQ certification.

AB&S assessed the current state by analyzing the business process, production facilities, and defect rates of DY Engineering. Consulting was given on procedures to improve quality and management. During this process, advice was given on various methods to improve quality, such as quality control based on statistics, and many new policies were introduced, including standardization of production and training and evaluation of persons in charge.

This project has helped DY Engineering establish a production and quality control system which has improved the corporate image and enhanced customer reliability. Productivity is expected to increase 50%, the defect rate is expected to decrease from 0.05% to 0.01%, and annual sales are expected to increase from 0.87 million dollars to 1.6 million dollars.

(3) Conditional Customized Technology Development (Daebul)

The typical promotion process of the projects in the ICCP is that companies discover various business ideas through the industry-university-institute collaboration, develop new technologies with the help of universities and research institutes, and eventually boost their competitiveness. In the process, universities inside the clusters provide knowledge, equipment, and personnel that companies require. The project for developing energy-saving hoist in the Daebul cluster is an outstanding case where industry-university collaboration has resulted in developing a new product and, as a result, securing the product competitiveness as well as price competitiveness of the product.

Before the project, hoist cranes produced domestically were not widely used due to their low credibility and, the cranes imported from Japan or Germany were too expensive for many companies. To deal with the problem, Bando Construction Co., Ltd., a member company of the Daebul Cluster, in collaboration with Mokpo National University located in the same cluster, developed a hoist equipped with the standardized regenerative converter.

The project was launched in March 2009, and made it possible to produce Regeneration Converter(R.G.C) by combining new technologies in January 2010. The newly-developed R.G.Cs are 20% cheaper than those produced by Yaskawa, a Japanese manufacturer of hoists. Their maximum capacity is 280kW, which is four times as much as 75kW of Yaskawa hoists.

Bando Construction Co., Ltd. generated 2.08 million dollars in sales during the first half of 2010 by selling 10 sets of hoists domestically and 11 sets overseas respectively, and is expected to have constant increase in sales.

Bando Construction Co., Ltd. plans to open a research institute and hire three researchers. Also, it plans to boost its R&D capability on the related fields such as constructing “integrated management system of hoists equipped with wireless communication modules” through the collaboration of mini-clusters in the pan regional cluster.

The development of hoists through industrial and academic cooperation in the Daebul Cluster is evaluated as a typical success case of industry-university collaboration where companies and universities develop technologies together, commercialize them, and achieve substantial sales.

(4) Industry-University Collaboration for R&D Projects

Even though many SMEs have core ideas or technologies, they often lack in systematic know-how and the funds to commercialize them. For the SMEs to survive and grow, it is imperative that they analyze the feasibility of technologies and their marketability, then develop them into products and manufacture them with the necessary funds being financed.

The Industrial Complex Cluster Program promotes projects to solve the companies’ difficulties and heighten technological or financial outcome through the collaboration of companies, universities and research institutes by providing assistance to the companies with core technologies, but not the

means to commercialize them, or the funds to finance them. Each cluster has been promoting an active collaboration between companies and universities in R&D. Some of these cases are going to be covered here.

Meanwhile, there have been many cases of technology innovation where new technologies of university labs are transferred to businesses and commercialized. Open Lab Program which connects industry and university in Noksan Cluster is a good example. Noksan Cluster holds regular meetings so that members from the engineering labs of local universities and mini clusters can meet each other. It is a meeting place where knowledge of the labs can be introduced to companies. The first Open Lab was launched in July 2009, with 7 labs of Korea Marine University and 11 companies. Busan National University(with 10 labs and 19 companies in October 2009) and Pukyung National University(with 13 labs and 18 companies in February 2010) followed suit and have been participating actively in the exchange of technologies with businesses.

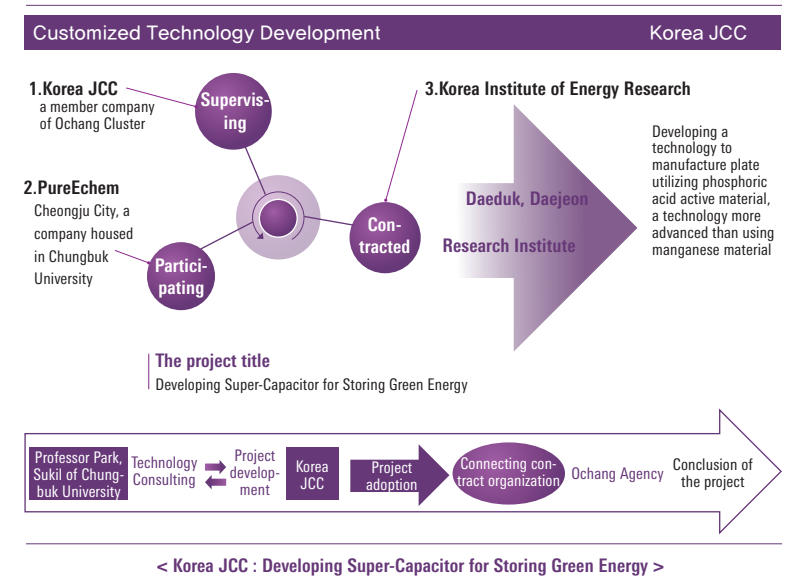
[Open Lab Program Connecting Industries and Universities of Noksan Agency]



Through the Open Lab Program connecting universities and industries, various projects have been discovered and supported. Developing electronic On-Off hydraulic solenoid valves [Korea Marine University-Enpos Co., Ltd.] is one example, and developing batteries for injection molding and hydraulic hybrid actuators [Busana National University-Dongshin EN Tech Co. Ltd] is another successful case.

Ochang Cluster is also taking part in active R&D through industry-university-institute collaboration. Korea JCC Co. Ltd, a member company of Ochang cluster, is developing a Super-Capacitor for Storing Green Energy with PureEchem Co. Ltd. a company housed in Chungbuk University. Chungbuk University is conducting technological consultation for the project, and the Korea Institute of Energy Research is participating in it as a research institute. At the conclusion of the project, a new technology will be developed for manufacturing plates utilizing phosphoric acid active material, a technology more advanced than using manganese material. It is predicted to replace existing technology and therefore reduce costs, and increase sales.

[A Case of Industry-University-Institute Collaboration Project by the Ochang Agency]



As we can see, there are a lot of successful cases of industry-university-institute collaboration. While some companies in mini clusters commercialize core technologies of SMEs through mutual collaboration, others have technologies of universities or research institutes transferred to them, preventing excellent technologies from being buried and ultimately boosting financial outcome through technology improvement or new product development. These projects that strengthen collaboration are the keys of the Cluster Program and will continue to be expanded.

4.5 Realization of Social Responsibilities of Clusters

(1) Removing Bad Smells for Green Cluster(Namdong)

In the 21st century, the major concerns in business management are environment and energy, and they are promoted as national strategic industries. There is possibility in every cluster that their environment get worse, albeit to different degrees. The collaborative project of improving the bad smelling environment promoted by Namdong Agency is an excellent case of enhancing the working environment of the region.

Namdong cluster implemented the project from August 2009 to June 2010, sponsored by Namdong Cluster Agency and Incheon University's Environmental Technology Support Team.

Specifically, it conducted a survey on the status of companies that emit bad odors, the types and amounts of pollutants causing bad smells, and manufacturing and pollution control facilities. After the survey, the result was entered into a database, and funding was granted to the member companies which needed to build facilities for environmental improvement. It also provided training to help the companies in the cluster to understand the related laws and regulations and cope with their problems. It invested about 1.8 billion dollars in 19 companies to build an anti-pollution infrastructure and to support the improvement of facilities.

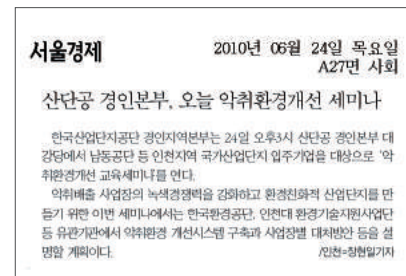
The project was able to reduce complaints about bad smells and to ease

the financial burden of companies which needed to build odor-controlling facilities. Work environment improvement led to production increase and higher job satisfaction for employees and executives. In particular, participating companies are thought to have gained quantitative economic results. For example, Ilsung Chemistry Ltd., is expecting to reduce costs by about 17.8 thousand dollars by building facilities that control odor and re-collect heat.

[Improving Environment for Green Cluster]



Business training in environment and energy industry in Japan



News article 2010. 6. 24

(2) Operating a Research Cluster for Highly Sensitive & Eco-friendly Auto Parts(Ulsan)

Interest in energy and environment provides various opportunities for developing products related to these fields, but are not limited to improving conditions of the workplace. Ulsan Complex in Dongnam region promoted a program of developing highly sensitive and eco-friendly solutions in its specialized industries such as mechatronics, automobile and shipbuilding.

Ulsan Cluster carried on a program of operating a research cluster for highly sensitive and eco-friendly auto parts and total interior parts. Its vision was “building an R&D cluster to boost collaboration, mutual developments, and technological competence between large, medium and small-size design parts companies.” It also aimed at “promoting global marketing with prior technology development and product development for top-end auto parts and high value products.”

The project was supervised by Ulsan Cluster. Ulsan Techno Park and Ulsan Research Institute for Industrial Science and Technology(RIST) participated in the project as contractors, and 2 large companies and 5 SMEs also joined. The project lasted for two years, from December 2007 to December 2009, and was awarded 2.2 million dollars in total.

Specific tasks for the project started with building a network of companies involved in the same business in order to enhance cooperative development. Through holding regular technology forums, seminars, and workshops(12 times in 2008 and 11 times in 2009), active exchange of technologies in designs took place. In addition, a cooperative system was built to avoid excessive competition among themselves and to be utilized for developing new product designs.

Especially, in November 2009, a joint exhibit booth was set up at Korea Autoparts & Auto-related Industries Show(KOAA Show 2009) in order to publicize technology outcomes and promote global marketing for them. A lot of buyers visited the exhibit and had business talks with participating companies from domestically finished car makers such as Hyundai, Kia, GM Daewoo, Renault Samsung, and foreign auto parts and finished car makers such as Ford, PSA Peugeot Citroen, Audi-Volkswagen, Nissan, Magna, etc.

[Joint Exhibit Booth for Advertising Developed Technology and Promoting Global]



The activities of the project led to the development of highly sensitive & eco-friendly auto parts such as a luminous garnish, a fragrant Air Vent System, INSKN technology, a headliner made from eco-friendly materials, a leather crash pad, and a panorama sun roof. These technologies are expected to be applied to mass produced cars and bring about more than an 87 million dollar increase in sales figures in the long run.

The eco-friendly cluster of Ulsan is a model case that succeeded in producing eco-friendly goods based on the Cluster network. The cluster discovered new business opportunities in response to the changing circumstances of energy & environment and management. Large, medium, and small-sized companies, as well as research institutes shared know-how in collaboration with each other and produced business outcomes by putting the developed products on the market.

V. Future Directions

5.1 Strategies and Challenges by Region

(1) Stimulating the Activities of Pan Regional Mini Clusters(Policy Supporting Headquarters)

A unique feature of Korean industrial cluster is that it has been operating mini clusters, small size alliances with large, medium and small companies, universities, research institutes, supporting organizations and local governments gathered by strategic business type or technology of each complex. They are industry-university-institute-government alliances in which regional innovation agents participate in order to promote mutual collaboration, joint study, and information sharing on a regular basis.

Meanwhile, as the industrial complex clusters were restructured into pan regional clusters, mini clusters of each complex were also reorganized into pan regional mini clusters. Pan regional mini clusters are small alliances connecting hub complexes of each specialized industry with their neighboring connected complexes in a pan regional economic zone. Like the existing mini clusters, they are also composed by business types or technologies.

Pan regional mini clusters are different from existing mini clusters in that they can be organized with participants from several complexes in a pan region instead of one complex. They would include specialized industries of hub complexes and their related industries. Especially, they are encouraged to form

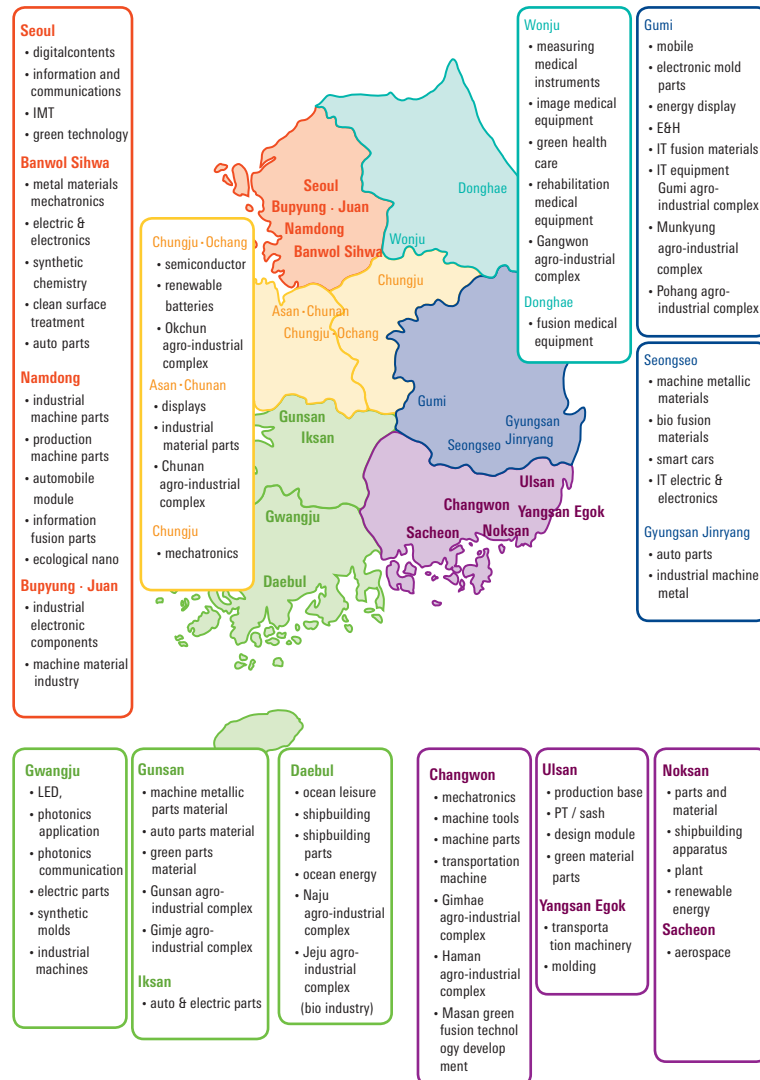
fusion & convergence mini clusters between manufacturing and knowledge service industries. In the organization and operation of mini clusters, openness and autonomy have been strengthened. Companies in a complex can participate in any mini clusters within a pan region without restriction, and they are allowed to decide freely on establishing and managing temporary sub-mini clusters.

[Changes in Relation to Mini Clusters]

Type		Existing MC(~2009)	Pan Regional MC (2010 ~)	Note
Size	Total	68 (including 13 agro-industrial complexes)	81 (including agro-industrial complexes)	Launching new complexes
	By complex	Within 7 (agro-industrial complexes separately)	partially restricted	Ensuring internal stability of MC operation
Composing unit		Individual complex	Pan regional economic zone	Expanding company's autonomy
Participants		Manufacturing Companies	Manufacturing+ non-manufacturing (including knowledge service)	Expanding beneficiaries

As the activities of pan regional clusters have been reinforced since 2010, the construction of pan regional mini clusters and their activities are expected to be more active. Companies in pan regional clusters are supposed to extend their business activities from existing complexes to pan regional complexes and therefore get more involved in exchange with other companies, and have greater business opportunities for fusion business with businesses in different fields.

[Status of Mini Clusters by Pan Regional Complex]



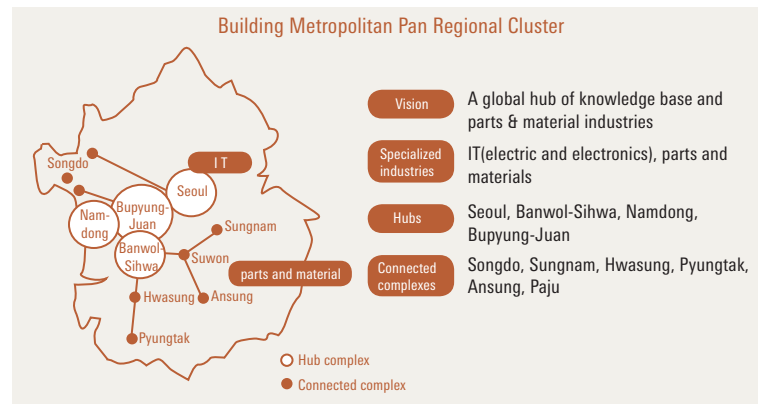
(2) Seoul Metropolitan Pan Regional Cluster

Seoul Metropolitan Region Cluster is made up with existing clusters of Seoul, Namdong, Banwol-Sihwa, and Bupyeong-Juan as hubs and their neighboring connected complexes. As of 2007, it includes 48.9% of the national population with 23,680,000 people, and 47.7% of GRDP with 37.8 billion dollars. It accounts for 58% of the companies with more than 500 employees, 77% of patent registrations, and 64% of researchers in the entire nation, making it top both in the economic scale and R&D innovation.

The metropolitan pan regional cluster has advantages over other clusters in that it has an excellent foundation for high tech manufacturing such as semiconductor and IT; it also has geographical benefits including major airports and harbors, a favorable condition for building a North East Asian logistics hub. In addition, it is rich in well-educated human resources.

The metropolitan cluster has several opportunities. High tech manufacturing industries such as information & communication, and semiconductors, where the region has an advantage, have been logging strong growth. In addition, due to globalization, a lot of outstanding talents and multinational companies are entering into the region. Also, the North East Asian economic zone is growing rapidly with Korea, China and Japan at its center. Based on these opportunistic factors, the metropolitan pan regional cluster aims at becoming "a global hub in knowledge base and parts & material industry" by specializing in IT and parts & materials.

[Seoul Metropolitan Pan Regional Cluster]



Seoul Digital Complex, Bupyeong Juan Complex, and Namdong Complex, which are hubs of the metropolitan region, plan to specialize in IT as their strategic industry, and Banwol-Sihwa and its neighboring areas plan to focus on parts and materials.

[Current Status of the Metropolitan Pan Regional Cluster]

Vision		A global hub of knowledge base and parts & material industries
Specialized industries		IT, parts & material(electric & electronics, machinery, parts & material)
Hubs and connected complexes	Hubs	Seoul Digital, Banwol-Sihwa, Namdong, Bupyeong-Juan complexes
	Connected complexes	(Seoul) Seoul Onsu, (Incheon) Incheon, Incheon machinery, Incheon Seobu(Kyonggi) Banwol plating, Suwon 1, Hwasung Balan, Hwasung Mado, Pyungtak Songtan, Ansong 1, Ansong 2, Songdo knowledge information, Paju Tanhyun, Sungnam
Direction	Space connection	Strengthening inter-connection between outstanding innovation infrastructure in the metropolitan region and multi core industrial agglomerations in the region.
	Agency connection	Acting as a broker in the inter-pan regional connection centered around large and innovative medium sized companies in the region
	Functional connection	Strengthening the connection between knowledge base industry highly developed in the metropolitan region and knowledge base service

(From: "Detailed Action Plan for the Pan Regional Reform of the Cluster Project," Ministry of Knowledge Economy, Jan. 2010)

(3) Chungcheong Pan Regional Cluster

Chungcheong Cluster is made up of the existing complexes of Asan, Cheonan, Ochang, Cheongju, and Chungju as hub complexes and their neighboring connected complexes. As of 2007, 4.91 million people are congregated within the region, accounting for 10.1% of the entire population, and the GRDP of the region amounts to 90.4 billion dollars, 11.4% of the entire nation. With 11% of the Korean companies with more than 500 employees, 7% in the number of patent registrations, and 14% in the number of researchers, it is on par with other pan regional clusters in terms of economic scale and R&D innovation.

The advantage of the cluster is that it has a great potential to be a center of domestic transportation and logistics due to its proximity and easy accessibility to the metropolitan region. It also has various innovation capacities in science, administration, logistics, and national defense. Especially, it houses the biggest R&D basis in the nation, Daeduk, and retains top researchers as well as infrastructure for R&D.

The international science business belt and high tech medical complex have been designated in the area, which is providing Chungcheong Pan Regional Cluster with excellent opportunities to extend its infrastructure for R&D in basic sciences and to help the bio industry leap to a higher level. It is also evaluated as having a mature environment for building fusion clusters between industries, technologies and regions. Its vision is to "build a New IT hub of Korea" with electric and electronics and its related industries as its specialized industries.

[Chungcheong Pan Regional Cluster]



While Ochang and Cheongju of Chungbuk have selected semiconductors, next-generation batteries, bio, and telecommunication as their specialized industries, Daejeon specializes in electronic data such as mechatronics, parts & material, bio, and electric & electronics. Asan and Cheonan of Chungnam plan to promote machinery and electric & electronics such as auto parts, agro & livestock bio, and cutting edge culture as their specialized industries.

[Status of the Chungcheong Pan Regional Cluster]

Vision		Building a new IT hub of Korea
Specialized industries		IT(electric & electronic and its related industries)
Hubs and connected complexes	Hubs	Asan(National), Cheonan(General), Cheongju(General), Ochang Science, Chungju
	Connected complexes	(Asan,Cheonan) Tangjung Techno, Tangjung 2, Cheonan industrial technology, Cheonan Majung, Asan Inju, Cehonan agro-industrial 3, Asan agro-industrial 2, Nonsan agro-industrial 2, Yesan agro-industrial 2, Dangjin agro-industrial 1, Chungyang agro-industrial 1 (Chungju,Ochang) Chung Buyong, Ochang Oetu, Jeongpyung, Okchun agro-industrial 6, Jincheon agro-industrial 7, Kumsan agro-industrial 3 (Chungju) Chungju Jeongwon, Emsung high tech complex, Emsung agro-industrial 3, Chungju agro-industrial 1
Direction	Space connection	Promoting connection both within Chungcheong region and inter-regions, Making active use of metropolitan & Dongbuk regional markets as test beds of IT products
	Agency connection	Promoting connection between companies and research institutes through Daeduk Special District, the largest R&D complex in Korea
	Functional connection	Strengthening the founding of businesses or supporting service adjusted to early growth period of industrial agglomeration

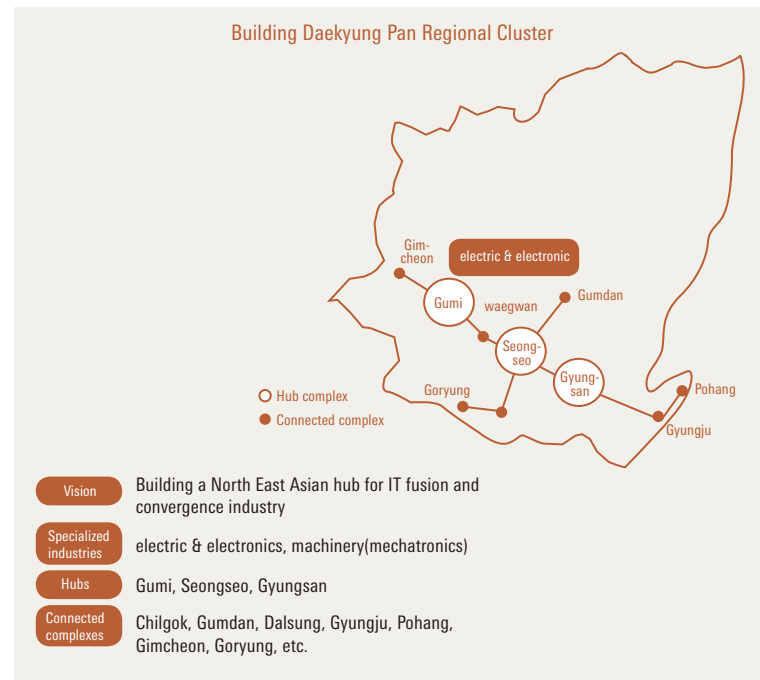
(From: "Detailed Action Plan for the Pan Regional Reform of the Cluster Project," Ministry of Knowledge Economy, Jan. 2010)

(4) Daekyung Pan Regional Cluster

Deakyung Cluster is made up of the existing Gumi, Seongseo, Gyungnsan(Jinryang) clusters as hubs and their neighboring connected complexes. As of 2007, it has 5.1 million people, which amounts to 10.5% of the entire population, and its GRDP is 77.4 billion dollars, accounting for 9.7% of the nation. Also, it has of 8% of all the companies with more than 500 employees nationwide, 4.7% of patent registrations in Korea and 6.7% of researchers, making it on par with other clusters in economic scale or R&D innovation.

The advantages of the Daekyung pan regional complex is that, as an electronic communication agglomeration with large companies at the center, it has been equipped with world class technology and mass production system in displays, digital TVs, and cell phones. And as the biggest electronic agglomeration, it has already established the basis to foster knowledge fusion regional industries.

[Daekyung Pan Regional Cluster]



Daekyung pan regional cluster is welcoming a new business opportunity as the market for electronic & communication devices is expected to grow continuously with the rapid advancement of knowledge information society.

The shortened life cycle of IT products also presents an opportunity for the cluster as it creates new or replaceable demands. The cluster specializes in electric and electronics, and machinery(mechatronics) industries with the vision of “building a hub for North East Asian IT fusion and convergence industry.”

The cluster will focus on machinery and electric & electronics as Daegu Seongseo, the hub of the cluster, plans to specialize in mechatronics, while Gumi will promote electric & electronics, and Gyung-san Jinryang, machinery.

[Status of Daekyung Pan Regional Cluster]

Vision		Building a North East Asian IT fusion & convergence industry hub
Specialized industries		Electric & electronics, machinery(mechatronics)
Hubs and connected complexes	Hubs	Gumi, Seongseo, Gyung-san(Jinryang)
	Connected complexes	(Gumi) ChilgokOegwan, Chilgok Gisan, Gumi agro-industrial 1, Gimcheon agro-industrial 2 (Seongseo) Daegu Gumdan, Dalsung 1, Dalsung 2, Goryung Dasan 1 (Gyung-san) Pohang, Gyung-san Jain, Gyungju Cheonbuk, Pohang 4, Pohang agro-industrial 1, Munkyung agro-industrial 1, Gyungju agro-industrial 2, Youngju agro-industrial 1
Direction	Space connection	Stimulating the creation of mega regional cluster in Youngnam economic zone by sharing responsibilities and reinforcing collaboration between Daekyung and Dongnam regions
	Agency connection	Building industry-university-institute network based on relatively excellent R&D infrastructure, and operating the Daekyung R&BD center
	Functional connection	Invigorating pan regional connections of business service industry (Connecting the R&D service of Daegu with the logistics & finance service of Busan)

(From: “Detailed Action Plan for the Pan Regional Reform of the Cluster Project,” Ministry of Knowledge Economy, Jan. 2010)

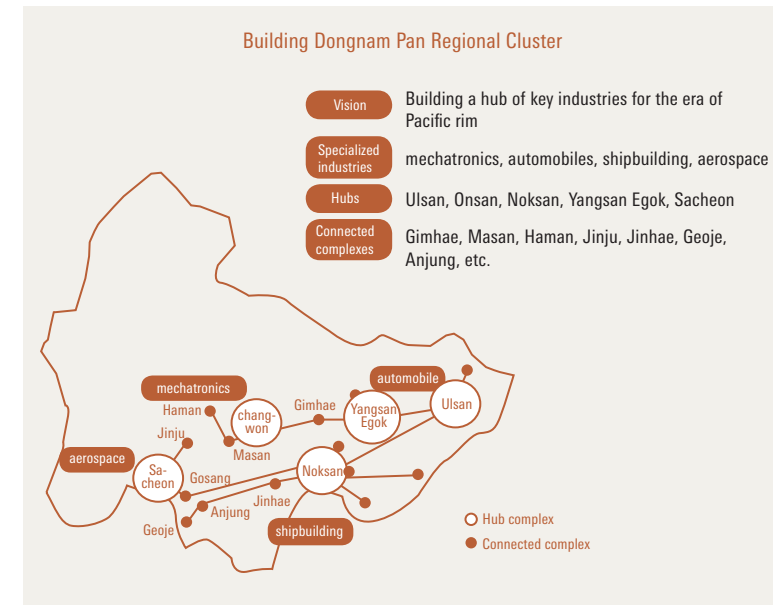
(5) Dongnam Pan Regional Cluster

Dongnam Cluster consists of the existing complexes of Ulsan·Onsan, Noksan, Changwon, YangsanEgok, and Sacheon as hubs and their neighboring connected complexes. As of 2007, it has 7.73 million people, accounting for 16.0% of the entire population, and a GRDP of 140 billion dollars for 17.6%. The cluster houses 14.8% of companies with more than 500 employees, 6.2% of patent registrations, and 8.8% of researchers, making it second only to the metropolitan region in the economic scale and R&D innovation.

One advantage of Dongnam cluster is that it has retained rich basis for production and industrial support with Ulsan and Busan at the center. It is also competitive because it has been industrially structured mainly with large companies, making it possible to rapidly cope with the digitalization of industries. Other strengths of this cluster are its excellent cultural resources, time-honored traditions, and skilled labor force.

The geographical conditions of Dongnam pan regional cluster make it a candidate for becoming the gateway for the economic hub of North East Asia. It is also faced with a new innovation opportunity as the entire industry and economy are getting more digitalized, and mechatronics, automobile and aerospace are to be promoted as the nation's strategic industries for new growth engines. Accordingly, Dongnam cluster has appointed future industries, including mechatronics, automobile, shipbuilding, and aerospace, as its specialized industries with the vision of "building a hub of key industries for the era of the Pacific rim."

[Dongnam Pan Regional Cluster]



The following specialized industries are going to be promoted: machinery and shipbuilding parts for Busan Noksan hub, automobile for Ulsan and Onsan, machinery and aerospace for Changwon, Sacheon, and Yangsan.

[Status of Dongnam Pan Regional Cluster]

Vision		Building a hub of key industries for the era of Pacific rim
Specialized industries		Mechatronics, automobile, shipbuilding, aerospace
Hubs and connected complexes	Hubs	Ulsan-Onsan, Noksan, Changwon, YangsanEgok, Sacheon general complex
	Connected complexes	(Changwon) Haman Chilseo, Masan free complex, Gimhae Dukam, Gimhae agro-industrial 6, Haman agro-industrial 7, Masan agro-industrial 1 (Ulsan) Ulsan Maegok, Ulsan Tongong 4 (Yangsan) Yangsan general, Yangsan agro-industrial 1 (Sacheon) Jinju Sangpyung, Sacheon Oetu, Jinju agro-industrial 4, Sacheon agro-industrial 3, Gosung agro-industrial 1 (Noksan) Jinhae national, Geoje Jukdo, Geoje Okpo, Tongyoung Anjung, Busan Sinho, Busan Science, Sinpyung-Janglim, Busan Jungwan, Busan agro-industrial 1
Direction	Space connection	Need to strengthen mega regional and global connection to secure excellent raw materials for parts and module production
	Agency connection	Building knowledge base & machine industry cluster through pan regional networking of industries, universities, research institutes, and governments within Dongnam region
	Functional connection	Backing up innovation capability of the manufacturing companies in the region by invigorating business service industry

(From: "Detailed Action Plan for the Pan Regional Reform of the Cluster Project," Ministry of Knowledge Economy, Jan. 2010)

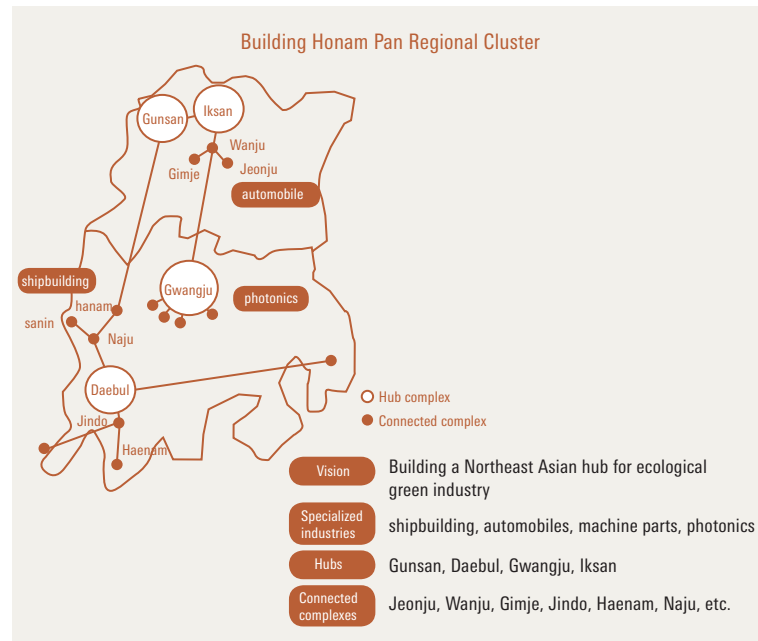
(6) Honam Pan Regional Cluster

Honam Cluster is made up of existing Gwangju High Tech & PyungdongOetu, Daebul, Gunsan, Iksan, Wanju as hubs and their neighboring connected complexes. As of 2007, it has 5.02 million people, which accounts for 10.4% of the whole population, and the GRDP amounts to 79.1 billion dollars, 10% of Korea's total GRDP. The number of companies with more than 500 employees comprises 6.8%, and patent registration 4.7%, making the cluster relatively small in economic scale and weak in R&D innovation compared with other clusters.

Honam Cluster has advantages in that it has a basis for strategic industries such as ecological green industry, photonics industry, and culture industry. Equipped with a favorable natural environment and abundant industrial resources, it has considerable potential to develop into a hub of West-sea rim.

Honam pan regional cluster has not attracted much interest or support so far. However, as pan regional economic zones are more recognized, and internal and external interests are growing in fostering regional industries, social consensus has been formed that the region should be developed and supported. Also its locational advantage, being the gateway both to the Pacific Ocean and the Asian continent, provides another opportunity. Honam has appointed shipbuilding, automobile, and machine parts as its specialized industries with the vision of "building a Northeast Asian hub of ecological green industry."

[Honam Pan Regional Cluster]



Honam cluster is planning to develop the following specialized industries: photonics in Gwangju, medium sized shipbuilding in Daebul, machine parts, automobiles, and electric & electronics in Gunsan & Gunjang and Iksan.

[Status of Honam Pan Regional Cluster]

Vision		Building a Northeast Asian hub for ecological green industry
Specialized industries		Shipbuilding, auto & machine parts, photonics
Hubs and connected complexes	Hubs	High-tech Gwangju, Pyungdong Oetu, Daebul, Gunsan, Iksan, Wanju
	Connected complexes	(Gwangju) Hanam, Pyungdong, Sochon, Bonchon, Jangsung agro 2, Hwasun agro-industrial 2, Hwasun agro-industrial 1, Gwangju agro-industrial 1 (Daebul) Daebul free complex, Mokpo Sapjin, Youngam Samho, Jindo Gunnae, Yeosu Yulchon, Mokpo agro-industrial 1, Muan agro-industrial 1, Naju agro-industrial 4, Haenam agro-industrial 1, Sinan agro-industrial 1, Youngwang agro-industrial 1, (Gunsan) Gunsan agro-industrial 1, Gimje agro-industrial 3, Iksan agro-industrial 1 (Iksan) Iksan national, Wanju Jeonju Science, Jeonju City High-tech, Jeongju 1, Jeonju 2, Iksan free complex, Wanju
Direction	Space connection	Strengthening connection between unit parts & module produced in Honam region and complete products and raw materials in metropolitan or Dongnam regions
	Agency connection	Attraction leading companies, including large companies and strengthening collaborative functions of network brokers
	Functional connection	Strengthening the connection between leading industries of ecological renewable energy in Honam region and traditional core (specialized) industries in industrial agglomeration

(From: "Detailed Action Plan for the Pan Regional Reform of the Cluster Project," Ministry of Knowledge Economy, Jan. 2010)

(7) Gangwon Pan Regional Cluster

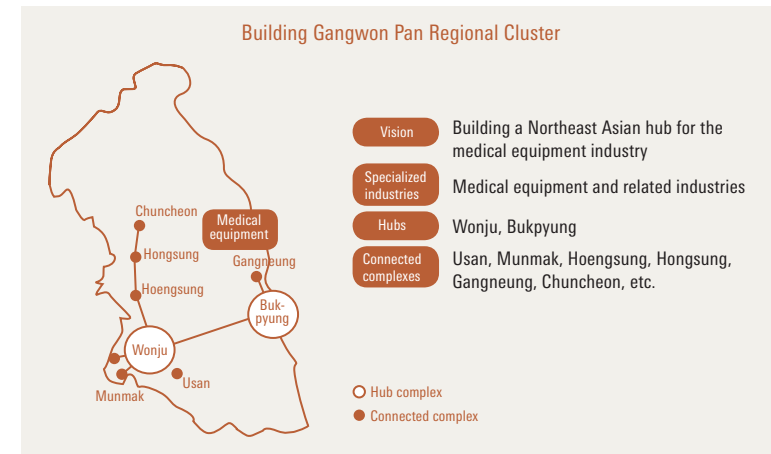
Gangwon Cluster is made up of the existing Wongju and Bukpyung complexes as hubs and their neighboring connected complexes. As of 2007, it has 1.47 million people, accounting for 3.0% of the whole population, and its GRDP is 22 billion dollars, 2.8% of the whole nation's. The cluster houses 2.2% of the nation's companies with more than 500 employees, with 1.4% of patent registrations, and 1.9% of researchers, placing it in a relatively low level of economic scale and R&D innovation compared with other clusters.

The advantages of Gangwon pan regional complex are that it is rich in tourist resources based on its clean natural environment and proximity to the metropolitan region. Besides, it has recently established an excellent medical infrastructure for a bio industry cluster, and it has already formed a strong network of industries, universities, research institutes and government.

Gangwon pan regional cluster is having a new opportunity as demand for health and relaxation increases with heightened interest in well-being, and some overseas bio organizations are willing to expand their businesses into Korea. Right now, both the government and companies are taking more and more interests in new business opportunities in the bio industry such as CRO or CMO. Also expectation for cutting edge industries, such as advanced materials and marine life is growing. Gangwon pan regional cluster has chosen to specialize in medical equipment and related industries with the vision of “building a Northeast Asian hub for the medical equipment industry.”

Gangwon pan regional cluster is going to foster different industries for their specialization: medical equipment in Wonju and machinery in Bukpyung are being promoted.

[Gangwon Pan Regional Cluster]



[Status of Gangwon Pan Regional Cluster]

Vision		Building a Northeast Asian hub for medical equipment industry
Specialized industries		Medical equipment(medical equipment and its related industries)
Hubs and connected complexes	Hubs	Wonju(Taejang, Donghwa agro-industrial), Bukpyung
	Connected complexes	(Wonju) Wonju Usan, Wonju Munmak, Wonju Donghwa, Chuncheon Hupung, Wonju agro industrial 1, Hongcheon ago industrial 2, Hoengsung ago industrial 2, Chuncheon ago industrial 2 (Bukpyung) Gangneung Jungso, Gangneung Science
Direction	Space connection	Maintaining mega regional and global connection and enhancing connection by attracting related industries and innovative resources
	Agency connection	Promoting to convert competing to win-win collaborative relations by strengthening openness between the same business type SMEs of medical equipment
	Functional connection	Planning to invigorate company agglomeration of medical equipment, parts & materials industries(downstream industry)

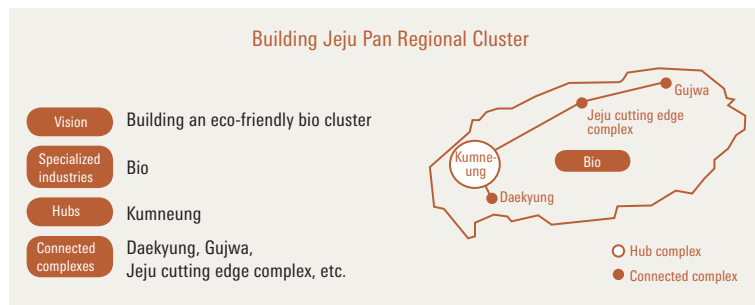
(From: “Detailed Action Plan for the Pan Regional Reform of the Cluster Project,” Ministry of Knowledge Economy, Jan. 2010)

(8) Jeju Pan Regional Cluster

Jeju Cluster consists of newly appointed Kumneung Complex as a hub and its neighboring connected complexes. As of 2007, it has 540,000 people, accounting for 1.1% of the whole population, and 7.04 billion dollars of the GRDP, accounting for 0.9% of the whole nation's. Also it includes only 0.4% of domestic companies with more than 500 employees, with patent registration being 0.5%, and researchers 0.3% of the entire nation, positioning it substantially behind other clusters in economic scale and R&D innovation.

However, the advantage of Jeju pan regional complex is that it has rich natural resources as well as a pollution-free clean natural environment, which will bring about future demands, such as tourists. Also the small size of the region makes it easy to build clusters connected with universities, research institutes and industries.

[Jeju Pan Regional Cluster]



Jeju pan regional cluster is welcoming a new opportunity as interest in life quality and leisure activities is increasing and more emphasis has been put on green industry. After Jeju was appointed as a pan regional cluster, people have taken more interest in building the cluster. Also the Special Law on Jeju Special Self-Governance has opened the possibility to foster clean first industry in the region. Jeju pan regional cluster has chosen bio as its specialized industry with the vision of "building an eco friendly bio cluster."

Jeju pan regional cluster plans to promote the bio industry of Kumneung complex as its specialized industry.

5.2 Future Directions of the Program

(1) Objectives and directions

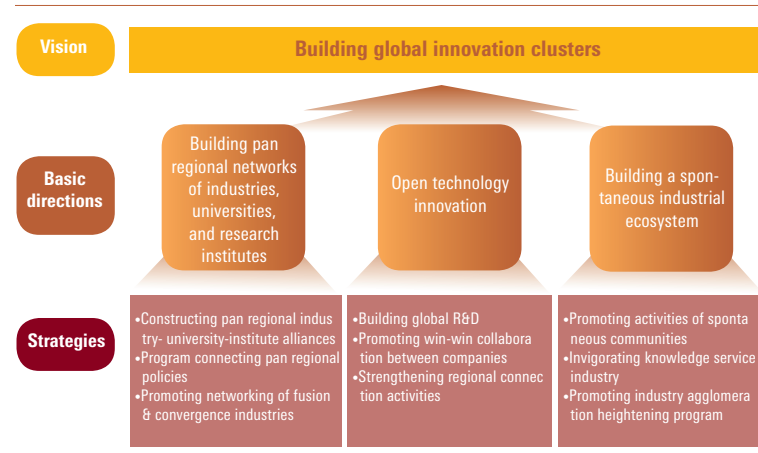
The vision of the Industrial Complex Cluster Program is to build 'globally competitive innovation clusters to lead Korean economy.' Since its launch in 2005, it has been divided into three phases: creating a Korean cluster model(first phase, 2005~2008), sharing the benefits of the Program with other parts of the nation(second phase, 2009~2012), and fostering global innovation clusters(third phase, 2013~2016).

Currently, in 2010, the industrial complex cluster program is judged to be in the second phase, sharing the benefits of the Program as can be seen in the

program to build pan regional clusters. After 2013, a range of policies are to be implemented in order to foster global innovation clusters.

In this chapter, we are going to cover the directions and strategies for the third phase, building global innovation clusters.

[Vision of the Industrial Cluster Program]



(From: "Internal Data of KICOX, July 2010)

(2) Main Strategies

The goal of building global innovation clusters will be promoted with special emphasis on building pan regional networks of industries, universities and research institutes, promoting open innovation, and creating spontaneous industrial ecosystems. The specific projects to achieve this goal are as follows:

First of all, the project of building a pan regional network of industries,

universities, and research institutes will be promoted by organizing the pan regional alliances, connecting inter regional policies, and reinforcing fusion and convergence industry networking.

Industry-university-institute alliances focusing on specialized industries should be organized first, and then an open network connecting hubs with other complexes should be established. This should boost up purchase and sales of the companies in particular pan regions up to 64%.

In order to reinforce inter-connection of pan regional policies, projects connected with regional development policies should be promoted, such as supporting leading industries. Also a comprehensive platform for supporting companies should be built.

Furthermore, in- or inter-cluster fusion & convergence industrial networking should be reinforced. Specifically, pan regional fusion alliances should be organized and, based on them, fusion and convergence between manufacturing and knowledge service or environmental industries should be promoted.

[Proposed Projects of Building a Pan Regional Network of Industries, Universities and Research Institutes]

Projects	Directions
Enhancing activities of pan regional alliances	<ul style="list-style-type: none"> Organizing industry university institute alliances centered around specialized industries in pan regional economic zones Building open networks linking hubs and connected complexes
Promoting program of inter-pan regional policies	<ul style="list-style-type: none"> Promoting program connecting with regional development policies like leading projects Building comprehensive platform for company support service
Promoting Networking of fusion & convergence industries	<ul style="list-style-type: none"> Organizing pan regional fusion alliances of industries, universities, and research institutes Promoting fusion and convergence between knowledge service, environmental industry and manufacturing industry

Open Innovation, the second project for building global innovation clusters, emphasizes constructing global R&BD, enhancing win-win collaboration between companies, and reinforcing inter-company connections.

Each cluster should try to expand innovation outward by reinforcing exchange and collaboration with domestic and overseas clusters. They should develop and manage collaborative R&BD programs with overseas organizations. Also joint R&D of large companies and SMEs should be actively promoted. One way to approach overseas marketing is to create a common brand for the complex or the companies in it. By operating pan regional R&D brokering support centers, the know-how of various companies could be exchanged.

Furthermore, reinforcing connection between regions is one of the main tasks of Open Innovation. In- or inter pan regions, in- or inter complexes, and inter-cluster connection should be strengthened and policy support and infrastructure for it should be provided.

[Proposed Projects of Open Technology Innovation Promotion]

Projects	Direction
Building global R&BD	<ul style="list-style-type: none"> Developing and operating R&BD collaborative program with overseas organizations Expanding exchange & collaboration between domestic and overseas clusters (e.g. Dongnam(Machinery)DZEMI, Germany, Daekyung (electronics)DOulu, Finland)
Promoting win-win collaboration of companies	<ul style="list-style-type: none"> Promoting joint R&D of large companies and SMEs Reinforcing overseas marketing through common brand of complex or companies Operating pan regional brokering centers for R&D
Strengthening regional connection activities	<ul style="list-style-type: none"> Strengthening connection activities between pan regional zones, industrial complexes in the zones, and between industrial complexes and individual locations Strengthening connection activities with other domestic clusters

Another important project for building global innovation clusters is building a self-supportive industrial ecosystem. To achieve this project, efforts should be made to promote spontaneous community activities, invigorate the knowledge service industry, and heighten industrial agglomeration.

Various spontaneous community activities should be encouraged. To support them, on- and offline infrastructure should be built and successful cases discovered and publicized.

Also, existing industrial complexes, which are centered among the manufacturing industry, should be supported so that they can be converted into complexes focusing on knowledge base and service industries. The knowledge service sector should be separated from existing industries, and then expanded and invigorated in connection with industrial complexes.

In addition, higher value added industries should be promoted by

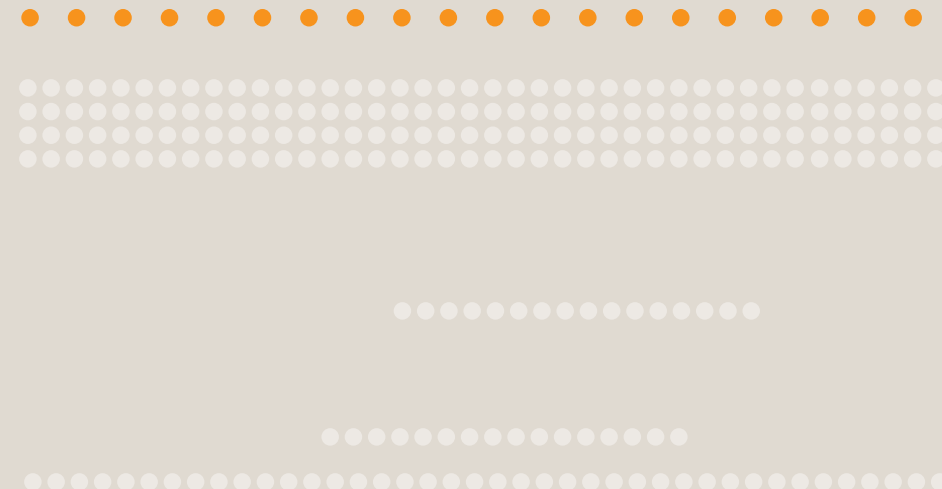
transforming existing industries into high tech or specialized businesses. By converting existing complexes to resource-circulated energy-efficient ecological industrial structures, sustainable industrial eco-system can be established.

[Proposed Projects to Build a Spontaneous Industrial Ecosystem]

Projects	Direction
Promoting activities of spontaneous communities	<ul style="list-style-type: none"> • Promoting various activities of spontaneous communities around companies in industrial complexes • Discovering and operating the spontaneous community model
Invigorating knowledge service industry	<ul style="list-style-type: none"> • Converting the existing manufacturing industrial complexes to knowledge base complexes • Support for invigorating knowledge service industry connected with industrial complexes
Project of heightening Industry agglomeration	<ul style="list-style-type: none"> • Converting business types of industrial complexes to those of cutting edge and professional • Converting to resource circulated and eco friendly industrial structures

As of 2010, industrial clusters of Korea are evaluated as being in their formative or growing stages. Currently, several policies including building pan regional industry-university-institute networks, promoting open innovation, and constructing self-supportive industrial eco-system are being implemented in aggressive and systematic ways. In 2016, when the 3rd phase of the Cluster Program concludes, it is predicted that Korean clusters will get abreast of and compete with world prestigious clusters like Silicon Valley in the U.S., Kista in Sweden, and Oulu in Finland which are equipped with their own respective independent mechanism.

MINI CLUSTER LIST



MINI CLUSTER LIST (Tel : 82+70+8895+ 0000)

Region	Hub	Name of MC	URL	Tel.No.	Address
Head quarter			http://www.e-cluster.net/		KICOX HQ, KICOX Venture Center, Guro-digital 3gil Guro-gu,Seoul, 152-759
Seoul region	Seoul	Digital contents	http://mini.e-cluster.net/DC	7316	KICOX Seoul HQ, KICOX Venture Center, Guro-dital 3gil Guro-gu,Seoul, 152-759
		Information and communications	http://mini.e-cluster.net/ICT	7314	
		IMT	http://mini.e-cluster.net/IMT	7313	
		Green technology	http://mini.e-cluster.net/GT	7315	
	Banwol Sihwa	Metal materials	http://mini.e-cluster.net/metal	7515	KICOX Seobu HQ, 773-2, Wonsi-dong, Danwon-gu, Ansan-si, Gyunggi-do, 425-852
		Mechatronics	http://mini.e-cluster.net/metromecha	7512	
		Electric and electronics	http://mini.e-cluster.net/elec	7519	
		Synthetic chemistry	http://mini.e-cluster.net/Chemist	7516	
		Clean surface treatment	http://mini.e-cluster.net/purify	7517	
		Auto parts	http://mini.e-cluster.net/autoparts	7515	
	Namdong	Industrial machine parts	http://mini.e-cluster.net/IM	7417	KICOX Kyungin HQ, 66BL, 637, Gojan-dong, Namdong-gu, Incheon, 405-817
		Production machine parts	http://mini.e-cluster.net/MT	7418	
		Automobile module	http://mini.e-cluster.net/AM	7415	
		Information fusion parts	http://mini.e-cluster.net/IT	7414	
		Ecological nano	http://mini.e-cluster.net/FINP	7411	
	Bupyung Juan	Industrial electronic components	http://mini.e-cluster.net/iec	7466	KICOX Juan Branch, 539-1, Kajwa-dong, Seo-gu, Incheon, 404-250
		Machine material industry	http://mini.e-cluster.net/mnm	7465	
Chung cheong region	Ochang Cheongju	Semiconductor	http://mini.e-cluster.net/semi	7648	KICOX Cheongju Branch, 6th Fl., Chungbuk-SME-Support-Center, 1508-1, Gagyung-dong, Heungduk-gu, Cheongju-si, ChungchungBuk-do, 361-260
		Renewable batteries	http://mini.e-cluster.net/REB	7645	
		Okchun agro-industrial complex	http://mini.e-cluster.net/AG	7641	
	Chungju	Mechatronics	http://mini.e-cluster.net/ELMA	7644	
	Cheonan Asan	Displays	http://mini.e-cluster.net/display	7624	KICOX Cheonan Branch, 2nd Fl., Cheonan-Support-Center, Seongseong-dong, Buk-gu, Cheonan-si, ChungchungNam-do, 330-300
		Industrial material parts	http://mini.e-cluster.net/ac-icom	7614	
		Chunan agro-industrial complex	http://mini.e-cluster.net/ac-complex	7623	
Daekyung region	Gumi	Mobile	http://mini.e-cluster.net/Mobile	7719	KICOX Gumi Branch, 164, Gongdan-dong, Gumi-si, KyungsangBuk-do, 730-030
		Electronic mold parts	http://mini.e-cluster.net/GE-PnM	7713	
		Energy display	http://mini.e-cluster.net/edmc	7717	
		E&H	http://mini.e-cluster.net/EnH	7718	
		IT fusion materials	http://mini.e-cluster.net/ITCM	7712	
		IT equipment	http://mini.e-cluster.net/IT-Equip	7721	
		Gumi agro-industrial complex	http://mini.e-cluster.net/GUMI-aico	7720	
		Munkyung agro-industrial complex	http://mini.e-cluster.net/Mungyeong-aico	7720	
		Pohang agro-industrial complex	http://mini.e-cluster.net/Pohang-aico	7720	
Daekyung region	Seongseo	Machine metallic materials	http://mini.e-cluster.net/3m	7760	KICOX Daegu Branch, Room 411, Daegu Machinery Part Institute, 12, Horim-dong, Dalseo-gu, Daegu, 704-240
		Bio fusion materials	http://mini.e-cluster.net/ft	7756	
		Smart cars	http://mini.e-cluster.net/dgcar	7755	
		IT electric & electronics	http://mini.e-cluster.net/dgit	7753	
	Gyungsan Jinryang	Auto parts	http://mini.e-cluster.net/smartcar	7757	
		Industrial machine metal	http://mini.e-cluster.net/i2m	7754	

Region	Hub	Name of MC	URL	Tel.No.	Address
Dongnam region	Changwon	Mechatronics	http://mini.e-cluster.net/mecha	7820	KICOX Chanwon Branch, 530, Changwon-Dae-ro, Changwon-si, KyungsangNam-do, 641-020
		Machine tools	http://mini.e-cluster.net/crafts	7812	
		Machine parts	http://mini.e-cluster.net/dnmc	7813	
		Transportation machine	http://mini.e-cluster.net/trans	7819	
		Gimhae agro-industrial complex	http://mini.e-cluster.net/kumkhan_gaya	7820	
		Haman agro-industrial complex	http://mini.e-cluster.net/ara_gaya	7818	
		Masan green fusion technology development	http://mini.e-cluster.net/green_MAFZ	7818	
	Ulsan	Production based parts	http://mini.e-cluster.net/Manufacturing	7878	KICOX Ulsan Branch, 57, Jeongdong-ro, Nam-gu, Ulsan, 680-817
		Car body and sash	http://mini.e-cluster.net/VBC	7876	
		Design module	http://mini.e-cluster.net/Interior	7874	
		Green material parts	http://mini.e-cluster.net/Part	7808	
	Noksan	Parts and material	http://mini.e-cluster.net/mci	7857	KICOX Busan Branch, 151, Noksan-sanup 6- gil, Gangseo-gu, Busan, 618-270
		Shipbuilding apparatus	http://mini.e-cluster.net/me	7845	
		Plant	http://mini.e-cluster.net/plant	7847	
		Renewable energy	http://mini.e-cluster.net/ge	7846	
	Yangsang Ekok	Transportation machine	http://mini.e-cluster.net/CM	7878	
		Molding	http://mini.e-cluster.net/MnF	7879	
	Sacheon	Aerospace	http://mini.e-cluster.net/aerospace	7865	KICOX Sacheon Branch, 53, Gongdan 2-ro, Sanam-myun, Sacheon-si, KyungsangNam-do, 664-942
Honam region	Gwangju	LED	http://mini.e-cluster.net/LED	7913	KICOX Gunsan Branch, 515-1, Osikdo-dong, Gunsan-si, JeonraBuk-do, 573-540
		Photonics application	http://mini.e-cluster.net/optics	7915	
		Photonics communication	http://mini.e-cluster.net/fiber	7914	
		Electric parts	http://mini.e-cluster.net/ele	7920	
		Synthetic molds	http://mini.e-cluster.net/mold	7913	
	Gunsan	Industrial machines	http://mini.e-cluster.net/machine	7912	KICOX Gunsan Branch, 515-1, Osikdo-dong, Gunsan-si, JeonraBuk-do, 573-540
		Machine metallic parts material	http://mini.e-cluster.net/machine_parts	7968	
		Auto parts material	http://mini.e-cluster.net/Auto	7965	
		Green parts material	http://mini.e-cluster.net/Green	7968	
		Gunsan agro-industrial complex	http://mini.e-cluster.net/Gunsan	7962	
	Daebul	Gimje agro-industrial complex	http://mini.e-cluster.net/Kimjea	7962	KICOX Daebul Branch, 339-3, Nabul-ri, Samgo-eup, Youngam-gun, JeonraNam-do, 526-891
		Ocean leisure	http://mini.e-cluster.net/yacht	7943	
		Shipbuilding	http://mini.e-cluster.net/shipbuilding	7946	
		Shipbuilding parts	http://mini.e-cluster.net/equipment	7944	
		Ocean energy	http://mini.e-cluster.net/windpower	7949	
	Iksan	Naju agro-industrial complex	http://mini.e-cluster.net/mechanic	7942	KICOX Iksan Branch, 2nd Fl., Iksan Custom Bldg, 191-3, Yeongdeung-dong, Iksan-si, JeonraBuk-do, 570-979
		Bio Industry (Jeju agro-industrial complex)	http://mini.e-cluster.net/bio	7947	
Gangwon region	Wonju	Auto & electric parts	http://mini.e-cluster.net/ane	7983	KICOX Wonju Branch, Room 505, 5th Fl., Medical Instrument Techno Tower, 1272, Maeji-ri, Heungup-myun, Wonju-si, Gangwon-do, 220-842
		Measuring medical instruments	http://mini.e-cluster.net/electro	7659	
		Image medical equipment	http://mini.e-cluster.net/images	7657	
		Green health care	http://mini.e-cluster.net/greencare	7659	
		Rehabilitation medical equipment	http://mini.e-cluster.net/rehabilitation	7657	
	Donghae	Gangwon agro-industrial complex	http://mini.e-cluster.net/wonju	7658	KICOX Donghae Branch, Room 401, 4th Fl., Imdong Logistics Building, 241, Guho-dong, Donghae-si, Gangwon-do, 240-230
		Fusion medical equipment	http://mini.e-cluster.net/gangwoncomi	7673	

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