THE INDUSTRIAL COMPLEX CLUSTER PROGRAM OF KOREA
01 Background
Examine changes in industrial complex policies that have led the Korean economy, and the background of emergence of the industrial complex cluster program.

02 Program Details
Examine the long-term vision and mid- to long-term strategies, which are the basis of program execution, as well as policy specifics, such as the execution system and process and support systems.

03 Mini Clusters
Assess the mini clusters across the nation.

04 Corporate Growth Support Centers
Learn about Corporate Growth Support Centers, which help develop global "emerging champions."

05 Outcome and Cases
Examine the performance and outcomes of the industrial complex cluster program, which bolsters the competitiveness of industrial complexes and companies, as well as major outstanding cases.
**Background**

Introduction to the program

**What is the industrial complex cluster program?**

The industrial complex cluster program focuses on clusters where industries are integrated, such as industrial complexes. Companies, universities, research institutes, and support organizations work together for such purposes as knowledge, experience, and technical exchange to strengthen the technological innovation competencies of SMEs and to develop industrial complexes as high-added-value clusters.

The industrial complex cluster program is also referred to as the cluster program. It was launched in 2005 as part of the balanced national development policy. Its purpose is to transform the input-type production-centered industrial complexes into knowledge base-type clusters where there is a virtuous cycle of creation and innovation.

**Introduction to the program**

**Why is the industrial complex cluster program needed?**

- **Joint development through sharing of know-how among industry, academia, and research**
  A cluster is an SME growth strategy. Industry, academia, research, and government share knowledge and experience to address difficulties that SMEs have difficulty resolving alone, thereby promoting mutual development.

Clusters are a growth strategy that is being adopted all across the world to overcome the global economic crisis and to restore growth potential. Advanced economies, such as the US and Germany, are fostering the manufacturing industry through cluster policies.

Germany is implementing a cluster program as a leading policy on fostering the manufacturing industry. By doing so, it is facilitating improvements in industrial competitiveness. Rather than the federal government, regional and state governments are pursuing hundreds of cluster initiatives. They seek to bolster industrial competitiveness through diverse bottom-up strategies. Germany formulated and is implementing policies, such as Industry 4.0, based on the federal government’s long-term roadmap. Industry, academia, research, and government are actively participating in the federal government’s policies, thus strengthening the connection between industry and science and technology.

As seen above, countries around the world are adopting clusters as a strategy for enhancing industrial competitiveness, and are bolstering industrial competitiveness based on cooperation among industry, academia, research, and government. Korea is also implementing industrial cluster policies in the name of the industrial complex cluster program.

**Clusters across the globe**

- Advanced countries are building large-scale clusters to boost national competitiveness. These include Silicon Valley in the US, Toyota City in Japan, Sophia Antipolis in France, and Kista in Sweden.
Launched in 2005, the industrial complex cluster program is helping improve corporate competencies and stimulate regional economic development by facilitating networking and cooperation among industry, academia, research, and government.

Program outline

Launched in 2005, the industrial complex cluster program is helping improve corporate competencies and stimulate regional economic development by facilitating networking and cooperation among industry, academia, research, and government.

Program period
Since 2005 (continued program)

Total program costs
Total KRW 630 billion (Total government contributions between 2005 and 2015)

Program scope
Industrial complexes across the nation (state, general, cutting-edge city, agricultural industrial complexes) and knowledge-based industrial clusters, etc.

Program details
Support the execution of R&BD programs to bolster the technological innovation capabilities of SMEs as well as networking activities to promote exchange and cooperation among industry, academia, and research, and build industrial clusters.

Support conditions
Contributions (Support no more than 70% according to support criteria per detailed program)

Executed by:
Korea Industrial Complex Corporation

Major programs
• Operate mini clusters
  To promote information exchange and mutual learning, support the networking and joint, cooperative activities of industry-academia-research council’s (mini clusters) that consist of a region’s innovation leaders, including those of companies, universities, research institutes, and support organizations in different businesses and fields of technology.
• Support R&D programs
  Support joint R&D programs, including industry-industry, industry-academia, and industry-academia-research programs, thereby helping to improve the technological innovation capabilities of SMEs.
• Support R&D promotion programs
  Support the creation of programs that reflect employees’ training needs that arise from corporate management and research, such as those on prototype production, application for industrial property rights, marketing and the opening up of new markets, as well as international standards certifications.
• Corporate Growth Support Centers
  For difficulties experienced in the areas of technology, management, and finance, experts in the respective areas stay on the site to coach the member company. This furthers the development of emerging champions.
• Global cluster exchange and cooperation
  Exchange and cooperation among industrial clusters in Korea and abroad is supported.

Vision and strategies

The objective of the industrial complex cluster program is to build self-sustainable clusters that are based on an industry-academia-research network and to build industrial ecosystems.

Vision

Develop world-leading industrial clusters that lead the Korean economy.

Goal

Formation phase (2005-2008)
Build an industrial cluster foundation
Growth phase (2009-2012)
Promote the cluster network
Independence phase (2013-2016)
Build a self-sustainable innovative cluster

Scope

Individual industrial complexes (12)
Metropolitan area industrial complexes (193)
Nationwide industrial complexes (All industrial complexes)

Strategies

Build a Korean-type cluster model
Formulate a customized development strategy for each complex
Build industrial clusters
Promote the global network
Advance network activities
Establish a self-sustainable industrial ecosystem

Execution programs

Build an industry-academia-research network
Improve R&D capabilities
Strengthen specialization of each complex
Improve the settlement and work environment
Program Details

Progress

After the program was launched in 2005, Korea Industrial Complex Corp. built a Korean-type cluster model and is spreading the outcome all across the nation.

In consideration of population, industry, infrastructure, and historical and cultural homogeneity, 17 cities and provinces were categorized into 11 zones – Seoul, Incheon, Gyeonggi, Chungcheong, Daegu and North Gyeongsang Province, Busan, Ulsan, South Gyeongsang Province, Gwangju, and Honam (including Jeju), North Jeolla Province, and Gangwon. To spread the outcome of the cluster program nationwide, the regions that are subject to the program were expanded from seven pilot complexes to industrial complexes all around the nation. Clusters that connect state, general, and agricultural industrial complexes were expanded. Also, programs are being executed to bolster the competitiveness of SMEs, with focus on specialized industries per zone.

Establishment of industrial clusters

Develop a specialized business type in each zone for sustainable development. Establish a connection between regional strategic industries and leading industries in each zone.

- **Seoul Zone**
  - Vision: Establish a global hub of high-tech convergence industries
  - Specialized industries: Electronic information, machinery, automobiles, shipbuilding, materials

- **Gyeonggi Zone**
  - Vision: Establish an innovative cluster of smart home appliances and automobiles
  - Specialized industries: Electronic information, automobiles, shipbuilding

- **Chungcheong Zone**
  - Vision: Develop a cluster of high value-added parts and materials
  - Specialized industries: Machinery, electric/motor, electronics

- **Incheon Zone**
  - Vision: Develop a cluster of high value-added parts and materials
  - Specialized industries: Machinery, electric/motor, electronics

- **North Jeolla Zone**
  - Vision: Establish an eco-friendly marine industry
  - Specialized industries: Marine equipment, automobiles, shipbuilding

- **Gangwon Zone**
  - Vision: Establish a cluster of high-tech convergence industries
  - Specialized industries: Electronic information, machinery, automotive parts

- **Jeju Zone**
  - Vision: Establish an eco-friendly cluster
  - Specialized industries: Tourism, shipbuilding, marine industry

- **Busan Zone**
  - Vision: Establish a cutting-edge parts industry cluster
  - Specialized industries: Shipbuilding, automobile parts, materials

- **Daegu Gyeongbuk Zone**
  - Vision: Establish a cluster of high value-added parts and materials
  - Specialized industries: Shipbuilding, marine industry, shipbuilding

- **Gwangju and Honam Zone**
  - Vision: Establish a global hub of high-tech convergence industries
  - Specialized industries: Electronic information, shipbuilding, petrochemicals, steel

- **Ulsan Zone**
  - Vision: Establish a cluster of high-tech convergence industries
  - Specialized industries: Shipbuilding, steel, petrochemicals, electronics

Seven pilot complexes

- Seoul
- Incheon
- Gyeonggi
- Chungcheong
- Daegu
- North Gyeongsang
- Busan
- Ulsan
- South Gyeongsang
- Gwangju
- Honam

12 industrial complexes

- Seoul
- Incheon
- Gyeonggi
- Chungcheong
- Daegu
- North Gyeongsang
- Busan
- Ulsan
- South Gyeongsang
- Gwangju
- Honam

Base-connected industrial clusters

- Seoul
- Incheon
- Gyeonggi
- Chungcheong
- Daegu
- North Gyeongsang
- Busan
- Ulsan
- South Gyeongsang
- Gwangju
- Honam

Industrial complexes across the nation

- Seoul
- Incheon
- Gyeonggi
- Chungcheong
- Daegu
- North Gyeongsang
- Busan
- Ulsan
- South Gyeongsang
- Gwangju
- Honam
02. Program Details

### Execution system and support program

--- | --- | --- | --- | ---
**Program focus** | R&D equipment, patents | Expertise | Development | Foster creative clusters for generation of high added value
**Execution organization (Governance)** | Innovative cluster executive team | Business supported organization | One specialized industry per complex | Due to four specialized industries per zone
**Complexes subject to the program** | 7 complexes | 12 complexes | 193 complexes | Complexes around the nation and select individual locations
**Supported areas (Business type)** | Regional headquarters of Korea Industrial Complex Corp. | 11 regional headquarters of Korea Industrial Complex Corp. | One specialized industry per complex | Due to four specialized industries per zone
**Execution process** | Full cyclical support in accordance with a company's management phase, such as technology development, commercialization, and marketization | | | | **Support systems** | Cluster program, Program outline, performance, support - Program, outstanding cases - Industrial cluster - Cluster database - Universities, research institutes, support organizations R&D equipment, patents - Research papers | News and notices - Relevant notices - Bidding and parceling out advertisements | Industrial complex information - Status, statistics, master plan in management - Policy (Quarterly, publication, industrial location) | Acquired ISO 9001 certification from the International Certification Regulate (Dec 18, 2007) | Acquired domestic business model patent (Dec 18, 2007)

### Execution organization

**Ministry of Trade, Industry and Energy**

- Korea Industrial Complex Corp.
- Cluster Policy/Regional Headquarters
- Cluster Evaluation Team

### Details

**R&D programs**

- Support for commercialization of production technologies: Joint development of core technologies by industry, academia, and research for development of new technologies or new products
- R&D support for fostering of innovative companies: Development of technologies for the company’s brand products to which a new technology or creative, innovative idea was applied
- Support for product production: Development of technologies for a product whose independence in business relations is guaranteed because it has low dependence on specific large companies or medium sized enterprises
- Total marketing support: Advertising and PR, exhibitions in Korea and abroad, market development, foreign standards certification
- Field and custom tailoring training: Training to improve productivity and technological innovation capabilities
- Promotion of technical transfers: Try out technologies, Dollar licensing fees
- Consulting for R&D planning: Analysis of niche markets, joint cooperation planning, etc.
- Mini cluster’s creative innovation idea support: From among programs that do not fall under any of the above types, these are programs that are needed to realize creative, innovative ideas

**R&D promotion programs**

- Operate mini clusters
- Support R&D programs
- Support R&D promotion programs
- Global cluster exchange and cooperation
- Corporate Growth Support Centers
### Mini Clusters

**Introduction to the program**

As part of the industrial complex cluster program, mini clusters are created and operated to identify and resolve difficulties that arise in corporate management, ranging from technology development to marketing.

What is a mini cluster? It is an industry-academia-research-government council that is established for a specific business type and field of technology. Innovation leaders of a region, including those of companies, universities, research institutes, and support organizations, jointly participate to engage in mutual cooperation, joint learning, and information sharing on a daily, ongoing basis.

**Support process**

1. **Discover programs**
   - Per business type
   - Per technology
   - Participate – Companies, experts, universities and research institutes, local governments, support organizations
   - Activity – Regular forums, technological innovation seminars, workshops, meetings, etc.

2. **Sharing of ideas for joint cooperation**
   - Ideas on programs
   - Ideas on creativity
   - Ideas on difficulties

3. **Selection of a program**
   - Consent from mini cluster members
   - Consent from half of the mini cluster members at least 30 people
   - Create a program plan
   - Review a program plan
   - Evaluation Committee
   - Consists of industry and academia experts in the same field of technology

4. **Execution of the program**
   - Composition of a separate team & resolution
   - Connection to a coordinator & resolution
   - Connection with government/policy programs
   - Resolution based on innovative organization network
   - Resolution by Korea Industrial Complex Corp.

5. **Follow-up management after program**
   - Submission of outcome report
   - Settlement of program costs
   - License fee payment
   - Submission (5-year) Report on use of outcome

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**Direction of support**

- Identify client (company)-specific programs that are closely related to the field and support them.
- Establish a customized support system to resolve difficulties that arise in corporate activities, ranging from business planning and technology development to prototype production, commercialization, and marketing.
03. Mini Clusters

Seoul Zone
- Digital content / ICT / Green IT / IT convergence
- Medical / BIC (Big data, IoT, Cloud)
- Machinery parts and materials

Incheon Zone
- Namdong: Industrial machinery and parts / Production base parts / Automotive modules / Information convergence parts
- Suwon: SMIT
- Futuristic convergence parts and materials
- Gumi: Automotive parts / Mechatronics / Electricity and electronics / Fine chemistry / Green / M&S
- Geumnam: Smart convergence
- Gwangju: Convergence electronic equipment / Industrial materials and parts / South Chungcheong Agricultural Industrial Complex
- Ulsan: Production base / Green materials / Automotive green technologies
- Okinawa: New technology convergence materials
- Guangdong: Optical communication / Optical convergence / Smart electronics / Automotive convergence / Medical parts and materials
- Daegu: Machinery and metals / Intelligent automotive parts / IT electricity and electronics / Bio convergence materials
- Gunsan: Machinery parts and materials
- Gyeonggi: Optical communication / Optical convergence / Smart electronics / Automotive convergence / Medical parts and materials
- Busan: Parts and materials / Plants / New and renewable energy / Shipbuilding and marine equipment
- Gwangyang and Gunsan: New technology convergence materials
- Gyeongsang: Machinery and shipbuilding parts and materials / Green parts and materials / Automotive parts and materials / Gunsan Free Trade Zone / Gunsan Agricultural Industrial Complex
- Gwangyang: Forming and processing
- Gwangyang: Steel materials and parts processing / Petrochemical convergence materials
- Gunsan: Machinery and shipbuilding parts and materials / Green parts and materials / Automotive parts and materials / Gunsan Free Trade Zone / Gunsan Agricultural Industrial Complex
- Gunsan: Auto & Elco Part / Cutting-edge convergence materials
- Gwangyang: Medical devices / Medical care and bio / Gwangyang Agricultural Industrial Complex / SLC (Safe Life Car)
- Gunsan: New convergence materials / Functional bio
Corporate Growth Support Centers

Introduction to the program

What is a Corporate Growth Support Center?

It is a company-customized program that is closely connected to the field, and is intended to foster world-leading professional, medium-sized enterprises. Experts in various fields are stationed in a complex to provide coaching to member companies on difficulties concerning technology, management, and finance that arise at production sites in industrial complexes.

Support process

Field visits/Counseling
Corporate assessment
Industrial analysis

Identification
Ascertain the cause of issues
Look for solutions
Customized coaching/Growth strategies

Support program

The competitiveness of a target company is identified by an onsite corporate assessment that is conducted from a comprehensive perspective. Afterwards, improvement measures are determined to address the company’s vulnerabilities and tasks. Also, a connection is made with support policies to support the company in its efforts to overcome difficulties.

Support to companies subject to focused development

Corporate assessment: Ascertain the corporate status and tasks for improvement
• Provide coaching on growth driver areas
• Make a connection to cluster R&D support programs
• Enable technical transfers through a connection with government funded research institutions
• Make a connection with innovation training programs
• Formulate new technology strategies
• Re-use R&D support funds
• Improve product performances
• Improve the technical skills of production personnel
• Make suggestions on ways to respond to emergency situations

Visualization of Customized coaching

Identify and assess the company status
Ascertain issues and causes
Look for solutions
Derived outcomes

Support to companies subject to focused development

Issues
Revenue measures
Growth potential

Corporate assessment

Environment
Level of technologies
Core competencies

Funds
Policy funds-based loan program

Mid-sized enterprise growth and development support program

Customized package solution

Human resources
Human resource support and development program
Outcome and Cases

Major performance

The industrial complex cluster program continually lured corporate participation in establishing and operating mini clusters for each business type and technology that reflect each zone’s characteristics. Tasks that can be supported by industry, academia, and research, based on cooperation among the three, were continually identified and support was provided. Various network activities are carried out to strengthen corporate competencies, such as support for identifying tasks and technology seminars. These contribute to the establishment of a consensus on cooperation among innovation leaders in the region.

Program support

<table>
<thead>
<tr>
<th>Year</th>
<th>Program support (Unit: KRW 100 million)</th>
<th>Support per R&amp;D program (Unit: KRW 1 million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>184</td>
<td>89.8</td>
</tr>
<tr>
<td>2006</td>
<td>251</td>
<td>105.5</td>
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<tr>
<td>2007</td>
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<td>96.5</td>
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<tr>
<td>2008</td>
<td>324</td>
<td>114</td>
</tr>
<tr>
<td>2009</td>
<td>287</td>
<td>112.1</td>
</tr>
<tr>
<td>2010</td>
<td>356</td>
<td>101.8</td>
</tr>
<tr>
<td>2011</td>
<td>362</td>
<td>144.5</td>
</tr>
<tr>
<td>2012</td>
<td>426</td>
<td>153.8</td>
</tr>
<tr>
<td>2013</td>
<td>354</td>
<td>148.3</td>
</tr>
<tr>
<td>2014</td>
<td>411</td>
<td>161.6</td>
</tr>
<tr>
<td>2015</td>
<td>325</td>
<td>167.5</td>
</tr>
</tbody>
</table>

Network activities

Network activities are carried out to bolster technological innovation competencies. These include technology symposiums, policy presentations, technology forums, and program meetings.

<table>
<thead>
<tr>
<th>Year</th>
<th>Policy presentation</th>
<th>Technology seminar</th>
<th>Technology forum</th>
<th>Program meeting</th>
<th>Symposium</th>
<th>Support organization consultation or recruit</th>
<th>Other</th>
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<tbody>
<tr>
<td>2005</td>
<td>71</td>
<td>354</td>
<td>195</td>
<td>668</td>
<td>821</td>
<td>364</td>
<td>454</td>
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<tr>
<td>2006</td>
<td>6,289</td>
<td>5,275</td>
<td>5,153</td>
<td>5,149</td>
<td>5,784</td>
<td>6,285</td>
<td>743</td>
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<tr>
<td>2007</td>
<td>5,208</td>
<td>5,275</td>
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<td>5,153</td>
<td>5,149</td>
<td>5,784</td>
<td>6,285</td>
<td>743</td>
</tr>
</tbody>
</table>
05. Outcome and Cases

Major outcome

[Increase in production contribution value and export contribution value from program participation]

- A total 2,792 companies examined for the production contribution value, and 1,126 companies examined for the export contribution value

- Production contribution: The volume of production and amount of exports attributable to support by the industrial complex cluster program

<table>
<thead>
<tr>
<th>Year</th>
<th>Production contribution</th>
<th>Export contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>KRW 1.0983 trillion</td>
<td>USD 190.18 million</td>
</tr>
<tr>
<td>2014</td>
<td>KRW 2.086 million</td>
<td>USD 16.13 billion</td>
</tr>
</tbody>
</table>

[Rise in operating profit margin of companies that received R&D program support]

- Average for manufacturing industry: 4.31%
- Average for companies that received R&D support: 5.28%

<table>
<thead>
<tr>
<th>Year</th>
<th>Average for manufacturing industry</th>
<th>Average for companies that received R&amp;D support</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>4.31%</td>
<td>5.28%</td>
</tr>
<tr>
<td>2013</td>
<td>4.40%</td>
<td>5.47%</td>
</tr>
</tbody>
</table>

[Average rise in production and exports of companies that participated in the program]

- Average volume of production: 16.13 billion
- Average amount of exports: 18.03 billion

<table>
<thead>
<tr>
<th>Year</th>
<th>Average volume of production</th>
<th>Average amount of exports</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>16.13 billion</td>
<td>18.03 billion</td>
</tr>
<tr>
<td>2013</td>
<td>16.62 billion</td>
<td>19.03 billion</td>
</tr>
</tbody>
</table>

Economic outcome

<table>
<thead>
<tr>
<th>Category</th>
<th>No. of patents</th>
<th>Program budget (KRW 100 million)</th>
<th>No. of patents per KRW 1 billion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Application</td>
<td>Registration</td>
<td>Application</td>
</tr>
<tr>
<td>2012</td>
<td>76</td>
<td>110</td>
<td>1.30</td>
</tr>
<tr>
<td>2013</td>
<td>108</td>
<td>62</td>
<td>1.98</td>
</tr>
<tr>
<td>2014</td>
<td>119</td>
<td>123</td>
<td>2.05</td>
</tr>
</tbody>
</table>

Technological outcome

[Patent outcome per KRW 1 billion in government support funds]

- Patent applications and technology concentration level of cluster-participating companies

  According to intellectual property statistics of the Korean Intellectual Property Office, the number of patent applications by participating companies is 4.6 times that of general SMEs. Also, the technology concentration level of participating companies is 1.67 times higher (2013).

<table>
<thead>
<tr>
<th>Year</th>
<th>General companies</th>
<th>Participating companies</th>
<th>Korea overall</th>
<th>Mini clusters</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>0.06</td>
<td>0.39</td>
<td>0.14</td>
<td>0.24</td>
</tr>
</tbody>
</table>

[Comparison with national R&D programs]

- Patent applications and technology concentration level of cluster-participating companies

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05. Outcome and Cases

Social outcome

Outcome and Cases

[Spread of R&D cooperation culture]
- Spread the R&D cooperation culture by establishing and operating industry-academia-research councils, carrying out network activities, and engaging in joint R&D and marketing
- Network activities were carried out on a total of 26,481 occasions over a period of three years, from 2012 to 2014

[Types of network activities & Percentage of meetings held to identify programs]

Outstanding cases

Entry into the offshore plant valve market: wings created by the large company-SME cooperation network!

Offshore plant valves are key parts for the offshore plant industry, which is garnering attention as Korea's new growth driver, following the shipbuilding industry. Korean SMEs are making efforts to develop relevant technologies and obtain foreign certifications, but these efforts are not leading to sufficient outcomes. Korea is 80% dependent on imports for offshore plant valves. Localization of offshore plant valves would lead to cost reductions for shipyards as well as reduced building time from stable valve supply/demand. This would substantially increase competitiveness.

Difficulties

Offshore plant valves need to perform various functions even in extreme circumstances. This is why their stability needs to be verified through fastidious certification and they require high-level specifications. Even when a company successfully develops an offshore plant valve, it is difficult for an SME to enter the market by its own efforts alone. This is because shipowners designate the items that will be applied in the field.

Resolution process

To establish a foundation for localization, outstanding valve production companies in Korea, shipyards, and Korea Industrial Complex Corp. joined together and identified valve companies with good technology. They cooperated in the overall process of product stability certification and shipowners' item approval. Shipyards are working on localization of the engineering phase. The cluster manager identified common industrial difficulties. A valve localization program was jointly carried out at the mini cluster with shipyards. Localization presentations were held. Completion of technological development or urgent tasks for technological development were identified as part of full support for localization. Tasks that were common among large companies and SMEs and that could be handled through cooperation were defined, after which solutions were applied in accordance with corporate competencies. Demand assessments and consulting were carried out on several occasions before task execution, presentations, and symposiums to set a direction that would result in actual benefits to companies. This led to a high level of satisfaction among companies.

Success points

- To make inroads into the offshore plant market, which companies found difficult to enter individually, shipyards, relevant organizations, and small- to mid-sized valve production companies came together and established a cluster.
- Meetings were arranged between the cluster’s leader, shipyards, member companies and foreign companies for OEM production and the establishment of a joint venture with outsourcing foreign valve companies. These meetings built trust.
- A foundation was established for localization of offshore plant valves, which Korea is 80% dependent on imports.

Outcome

- Some of the ball valves used for a recent project carried out by Daewoo Shipbuilding & Marine Engineering were successfully localized. This laid the foundation for receiving recognition for the excellent quality offered by Korean valves and for localizing other valves as well.
Difficulties
As a result of tightening of regulations on fuel efficiency and exhaust emissions, ‘lightweight’ and ‘improvement in fuel-efficiency’ have become major issues in the global automotive industry. The panorama sunroof was around 35 kilograms heavier than other sunroofs and thus needed weight reduction. The primary materials used for panorama sunroof frames were steel and plastic, and the frame is a factor in passenger safety. There was, therefore, a great need to develop technology that would make the frame lightweight while maintaining its stiffness.

Resolution process
What was critical was to develop a technology that would retain only the advantages of steel and plastic frames, while ensuring measurement stability, high-stiffness, and weight reduction. A measure was devised that involved inserting steel parts to a plastic frame, followed by injection molding, thus resulting in a hybrid frame. The structural design needed for hybrid frame development could be handled in-house. However, difficulties were experienced in the process of finding a partner that would jointly handle verification as well as large plastic injection molding and performance evaluation. The personnel network of the mini cluster was used to recruit an organization that would jointly conduct the program. In this process, the cluster manager rendered active support in introducing experts in various fields for hybrid frame development and in establishing a joint development team.

Success points
- Became Korea’s first to gain panorama sunroof development experience
- Exchange and cooperation with Hyundai Motor and other relevant organizations
- Developed technology in relevant fields, including two patents

Outcome
The world’s first large injection-molded product mass production technology to apply CFRP was developed, leading to the receipt of new technology (NET) certification in 2013. This is planned for application to Hyundai Motor’s new cars. A sales increase of KRW 9.7 billion is expected for 2014. Thirty-five new employees will be hired to run the new production lines.

Difficulties
The standard practice in Korea and abroad is to use a semi-spade as the rudder. A shortcoming of the semi-spade is that there is gap cavitation between the rudder and rudder horn. This damage is mostly caused by long-term use, but it was not a big issue. However, today’s large high-speed, high-horsepower ships suffer serious erosion due to gap cavitation, and they must undergo major reinforcement work every five years. The number of orders for large and ultra-large container ships is now rising, and there are limitations in using the standard semi-spade rudder. There is also an urgent need to localize the spade rudder, for which Korea has been dependent on imports.

Resolution process
While engaging in shipbuilding parts mini cluster activities, Hyundai Samho Heavy Industries presented a localized item in relation to shipbuilding. Hyundai Samho Heavy Industries is a large corporation and joined hands with shipbuilding experts at Mokpo National University. It held a meeting on R&D that it would do on the condition that it would afterwards receive orders for products developed thereby. To develop rudder design skills, nine design personnel were put through 90 hours of CAD and CATIA design training, held twice a week from November 2010 through April 2011. In mini cluster activities, the cluster manager identified and supported cooperation projects between large companies and SMEs in the region. The cluster manager also supported various programs (training programs, etc.) that would enable corporate growth in connection with support organizations in the region, thereby helping train up technical personnel.

Success points
- Localized development of the full spade rudder
- After the completion of the project, contracts totaling KRW 8.5 billion were signed with Korean and Chinese shipyards
- Bolstered competitiveness through joint R&D with a large corporation

Outcome
Korea was fully dependent on imports for full spade rudders. A full spade rudder was successfully developed, and it has been recognized as being the most technologically advanced in the world. The rudder was aggressively marketed toward large shipyards and shipowners in Korea through such means as a localization development presentation. After the project, contracts totaling KRW 8.5 billion were signed with large shipyards, including Samsung Heavy Industries and Hyundai Heavy Industries. There has been a rise in contracts with foreign shipyards as well, including those in China. This has resulted in a substantial rise in sales.
05. **Outcome and Cases**

**Outstanding case 4**

Prototype production  

Localized an eco-friendly integrated dental articulator, and entered the American market  

Geoseung is an active part of a global supply network that includes the e-business market, and is growing into an international company in the area of plastic products, including automotive parts, medical treatment supplies, and industrial supplies. It is contributing to the development of the dental technology industry by developing and supplying its EASY-ONE system.

**Difficulties**

Improvements in the articulator production environment and precision. The use of plaster during model assembly resulted in dust and loss of process time. This, in turn, led to extended work hours and degraded the work environment. There was a need to completely offer original articulator functions while addressing plastic articulator shortcomings, including stability and precision.

**Resolution process**

Various eco-friendly medical treatment materials that can replace plaster were developed. A product design was created that could absorb the plastic tolerance. A fair was held on a prototype for each raw material. Through such product field tests, material quality was optimized. The cluster manager agreed on the need to develop an articulator prototype that addressed the shortcomings of the previous EASY-ONE system through an onsite forum. The cluster manager rendered active support so that the company could be chosen for a project that supports prototype production in order to bolster the company’s export capabilities.

**Success points**

- Obtained patents and technologies for dental articulator production  
- Established a standardized system through field testing

**Outcome**

The 14-step process was reduced to a 7-step process to result in annual cost reduction of around KRW 1.2 billion (market share of 2%). Sales are expected to substantially rise in 2015 to KRW 800 million in Korea and KRW 3 billion in foreign markets, including the US.

**Outstanding case 5**

Marketing support  

Hello Jadoo records top ratings on Tooniverse in both 2012 and 2013  

Atoonz is a venture company that became famous with the Hello Jadoo series. After recording a top rating on Tooniverse, which is a specialized animation channel, Hello Jadoo was exported to Asian countries, including China and Taiwan, and became a major hit. Character products were produced, and mobile services are offered. Since Season 2, Atoonz has been planning and producing a special series.

**Difficulties**

There were doubts over whether a business presentation or event for a specific character (company) could become a mini cluster project under Seoul Regional Headquarters due to a lack of awareness of content. Companies in a complex moved forward with signing licensing contracts, leading to many cases of collaboration on specific details.

**Resolution process**

Awareness was raised when Hello Jadoo recorded top ratings on Tooniverse in both 2012 and 2013. A sense of harmony was created among residents in the region and cooperative relations were built among companies by holding events, exhibitions, and presentations. Korea Industrial Complex Corp. rendered support and served as a mediator. This was a high-risk project, and it required at least three years from planning to production and commercialization. Nevertheless, the cluster manager showed unwavering interest and strived to provide assistance.

**Success points**

- Video production support  
- Participation in domestic exhibitions (Seoul Character Licensing Fair 2013)  
- Business presentations  
- Broadcast celebration event hosted by the mini cluster in Seoul Regional Headquarters

**Outcome**

After recording top ratings in Korea, export contracts were signed. The company is now actively engaged in the character business. It is planning and producing a special series after Season 2.
Dentis (CEO Sim Gi-bong) is a medical solution company that was founded in 2005. It has focused primarily on the implant business over the past decade, and it launched a medical device business. The company developed a surgical light (Luvis) in 2010. This light is installed in hospital surgery rooms. It does not create shadows even when a surgeon’s hand or head is in between the light and the surgery area. Dentis was awarded the Ministry of Trade, Industry and Energy Award for Good Design (grand prize) for Luvis in 2013. The company also received the Export Tower Award on Trade Day in 2012, was designated as the KODIT Star Company in 2013, and received the Design Technology Innovation Award in 2014. Dentis is now determined to take the lead in the medical 3D print market, thereby becoming a global health care-specialized company.

Difficulties
Dentis focused on the implant business before launching its medical device business in 2010. It developed the surgical light Luvis as part of its new business, but experienced a number of difficulties. Luvis was expensive compared to the product offered by Germany’s MARQUE, an advanced company, and the company’s product lineup did not include large and mid-sized product groups. There was, therefore, an urgent need to develop various products. Another problem was that the company’s medical device-specific sales network was not systematically established. The company actually used its previous dental sales network to sell Luvis in Korea and foreign markets. There was clearly a need to build a new international sales network and a new business organization, and to establish new business relations.

Resolution process
To overcome such difficulties, Dentis signed a development company agreement with the Gumi Corporate Growth Support Center in 2014. The Corporate Growth Support Center assessed Dentis and came up with a growth roadmap. It came to the conclusion that the company launched the surgical LED light business in 2010 to achieve further growth based on the success of the implant business, but that the company failed to move forward. The Corporate Growth Support Center, therefore, decided to implement the Dentis Step-Up Project. The first task was developing a surgical light called M200 for the global market. This new product had better functionality than products offered by foreign competitors, and was competitive in the global market. This product was submitted to the K-hospital Exhibition and Germany’s MEDICA medical device exhibition. The second task was reducing the prices of existing products. Price reductions of around 12% were made through structural changes, diversification of buyers, and localization of parts. The third task was related to sales and marketing. The company developed foreign surgical light markets and established a domestic distribution network. These efforts made the company competitive in the global market by both price and quality. It also acquired new customers by developing a new business.

Outcome
Dentis engaged in diverse efforts together with the Corporate Growth Support Center to achieve growth, and the company accomplished an outstanding sales performance of KRW 26.3 billion in 2014. This was enabled by strategic cost reductions and attraction of new customers. The company also conducted an ERP unit cost analysis on existing product groups and Pareto analysis on purchasing costs to reduce costs by 12%, or KRW 180 million. The company developed an aggressive new business model and generated sales of KRW 270 million from 15 companies in Korea and KRW 70 million from 13 foreign companies.

Pareto analysis and submission of product at exhibitions
After four months of development, the company unveiled the M200 product and achieved cost reductions of KRW 98 million. The company’s new LED plant and business expansion led to job creation, in addition to greater financial performance. Dentis achieved growth of 9% in sales, 9% in employment, and 17% in exports compared to 2013. The company’s execution of suggested tasks led to the establishment of a full lineup. It became truly competitive in the small, mid-sized, and large surgical light markets. Based on these accomplishments, Dentis is continuing efforts to grow into a global health care-specialized company.
05. Outcome and Cases

Global cluster network cooperation

- Britain
  - International Synergies Ltd.

- Germany
  - Berlin branch of World OKTA
  - NRW INVEST

- Turkey
  - Izmir Chamber of Commerce and Industry

- Uzbekistan
  - Ministry of Economic Relations
  - Ministry of Light Industry

- India
  - Mahatma (India) Chamber of Commerce and Industry

- China
  - Shanghai Jiao Tong University in China, National Institute for Environmental Studies in Japan
  - JSC KAZYNA
  - National Innovation Fund (NIF)
  - WindorEssex Economic Development Corporation

- Kazakhstan
  - Ministry of Economic Relations
  - Ministry of Light Industry

- Japan
  - Fukuoka, Japan
  - TAMA Industry Revitalization Association
  - Ministry of Economic Relations

- Canada
  - Korean-American Chamber of Commerce

- US
  - US Economic Development Administration under the Department of Commerce

- Germany
  - Berlin branch of World OKTA
  - NRW INVEST
05. Outcome and Cases

Industrial Cluster Day

Korea Industrial Complex Corp. holds Industrial Cluster Day every year to share and publicize the outcomes of the industrial complex cluster program, and to examine various agenda items for growth into a global cluster.

1st Industrial Cluster Day, Thursday, June 8 – Friday, June 9, 2006
Slogan: An innovative cluster is our country’s hope!
Venue: Grand InterContinental Seoul
Hosted by: Ministry of Trade, Industry and Energy, Balanced National Development Committee
Major programs:
• International conference on innovative clusters
• Academic seminar of the Industrial Cluster Society
• Display of outstanding cases
• Encounter between industrial complexes and innovative clusters
• Export consultation meeting per strategic industry
Organized by: Korea Industrial Complex Corp.

2nd Industrial Cluster Day, June 7, 2007
Slogan: The “industrial complex” innovative cluster is our country’s hope!
Venue: Grand InterContinental Seoul
Hosted by: Ministry of Trade, Industry and Energy, Balanced National Development Committee
Major programs:
• International conference on innovative clusters
• Purchase and sale presentations by invited global companies
• Export consultation meeting per strategic industry
• Key strategies on global technical transfers and commercialization
• Beautiful industrial complex photo exhibition
Organized by: Korea Industrial Complex Corp.

3rd Industrial Cluster Day, November 12, 2008
Slogan: Recreational industrial complexes as autonomous, cooperative, and creative development network space
Venue: Ministry of Knowledge Economy, Balanced National Development Committee
Hosted by: Ministry of Knowledge Economy, Balanced National Development Committee
Major programs:
• Show of a video on cluster outcomes and vision for industrial complexes
• International conference, etc.
Organized by: Korea Industrial Complex Corp.

4th Industrial Cluster Day, November 13, 2009
Slogan: Bolster global competitiveness through cooperation among industrial complexes
Venue: InterContinental Seoul COEX
Hosted by: Ministry of Knowledge Economy, Presidential Committee on Regional Development
Major programs:
• Industrial complex-centered industrial cluster establishment strategies
• Presentations on cluster experience memoirs and showing of video on outstanding cases of activities
• Industrial cluster development and global competitiveness
• Service for major specialized industry of industrial complexes
Organized by: Korea Industrial Complex Corp.

5th Industrial Cluster Day, November 17, 2010
Slogan: Establishment of an autonomous cluster that can achieve sustainable growth
Venue: Kimdaejung Convention Center
Hosted by: Ministry of Knowledge Economy, Presidential Committee on Regional Development
Major programs:
• Concert on successful cases
• Major industry conference
• Korea-China-Asia regional industry technology exchange symposium
Organized by: Korea Industrial Complex Corp.

6th Industrial Cluster Day, Wednesday, November 16, 2011
Slogan: Communicating companies, changing industrial complexes, and sharing clusters!
Venue: Daejeon CEX
Hosted by: Ministry of Knowledge Economy, Presidential Committee on Regional Development
Major programs:
• Cluster conference
• Meeting About Our Mini Cluster
• b2b Tech Talks (consultation meeting)
Organized by: Korea Industrial Complex Corp.

7th Industrial Cluster Day, Monday, November 26, 2012
Slogan: With the cluster, innovation is yours
Venue: InterContinental Seoul COEX
Hosted by: Ministry of Knowledge Economy, Balanced National Development Committee
Major programs:
• Korea-China-Japan Business Cooperation Forum
• A presentation on outstanding cluster companies to invited members of press corps
• UCC presentation
• b2b Tech Talk consultation meeting
Organized by: Korea Industrial Complex Corp.

8th Industrial Cluster Day, Thursday, November 14, 2013
Slogan: Base of the creative economy – Industrial cluster
Venue: 63 Convention Center in Seoul
Hosted by: Ministry of Trade, Industry and Energy, Presidential Committee on Regional Development
Major programs:
• Cluster conference
• Export consultation with invited foreign buyers
• Industrial complex photo exhibition
Organized by: Korea Industrial Complex Corp.

9th Industrial Cluster Day, Monday, November 26, 2012
Slogan: 50 years of passion, 100 years of hope
Venue: Guro Digital Complex in Seoul, Daegu Headquarters of Korea Industrial Complex Corp.
Hosted by: Ministry of Trade, Industry and Energy
Major programs:
• Academic conference
• International forum
• Office Worker Necktie Marathon
• Unveiling ceremony for restoration of the Export Lady Award
Organized by: Korea Industrial Complex Corp.
A global conference was held from November 3 to 6, 2015 at EXCO in Daegu. It was attended by around 900 economic development and cluster experts from 86 countries across the globe. The conference addressed the ‘Creative Economy and Cluster: Business model and policy agenda.’ Experts in various fields shared insights and information on new industrial cluster policies and strategies. They included economic development experts, international organization members, policymakers, entrepreneurs, and researchers from all around the world.

TCI 2015 Global Conference

Event outline
Date and venue: Tuesday, November 3 – Friday, November 6, 2015 / Daegu EXCO, Daegu and Gyeongsang Zone Industrial Complex
Attendance: 900 persons from 86 countries (300 persons from Korea, 600 persons from foreign countries)
*Initial plan (450 persons)
Hosted by / Organized by: Ministry of Trade, Industry and Energy / Korea Industrial Complex Corp., TCI Network
Theme: Creative Economy and Cluster: Business model and policy agenda

Execution process
March 5, 2014: Submitted a proposal on holding the conference (Korea Industrial Complex Corp. → TCI)
June 16, 2014: Signed a cooperation agreement (Korea Industrial Complex Corp. ↔ TCI)
November 10 – 13, 2014: Participated in the 2014 conference in Mexico and made a presentation

Major programs
Conference
Keynote speech, theme lecture, parallel sessions, special debate, cluster lab, etc.
* From among the 84 research papers that were received, 70 papers were selected. Twenty academics from Korea and abroad were invited to give presentations on the theme.
Cluster tour
Three-hundred persons attended a tour of the Daegu and Gyeongsang Zone Industrial Complex that consisted of seven courses.
Official events
Opening and closing ceremonies, welcoming reception, official luncheon and dinner, TCI General Meeting and BOD meeting, etc.
Subsidiary events
1) Consisted of 18 booths of mini cluster member companies
2) 114 companies made an application, and 36 companies were matched
3) Seven mini cluster member companies gave presentations

Outcome and Cases

1 day_Cluster Tour, Welcome Reception

2 day_Opening Ceremony, Keynote Speech, Trade Meetiong

3 day_Cluster Lab, Parallel Session, Conference Dinner

4 day_Wrap up Session, Closing Ceremony