

kotra EXPRESS

KOREA'S SEMICONDUCTOR INDUSTRY

Interview

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- Honorary Ambassador of Foreign Investment Promotion for Korea
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Foreign Direct Investment

LAM RESEARCH TO BUILD TECHNOLOGY CENTER IN S. KOREA

The South Korean unit of U.S. semiconductor equipment maker Lam Research Corp. will build a technology center in South Korea, officials said Nov. 20.

The Yongin city authorities signed a deal with Lam Research Korea earlier in the day to provide the supplier of wafer fabrication equipment and services with an industrial site in Yongin, about 50 kilometers southeast of Seoul, city officials said.

Lam Research plans to invest about USD 100 million in the new center in Yongin, said an official who is in a position to know about the plan. Yongin is a growing semiconductor cluster in South Korea. SK hynix Inc., South Korea's

second-largest chipmaker, is set to build four semiconductor fabrication plants in Yongin by the end of 2024.

A South Korean government delegation met with executives of Lam Research in Silicon Valley earlier this week to discuss the progress of the investment plan and South Korea's incentives to Lam Research, the official said. He asked not to be identified, citing policy.

The delegation also held an investor meeting with other U.S. companies, including chip gear maker Applied Materials, Intel Corp., Nvidia Corp., Velodyne Lidar—developer of light detection and ranging sensors—and streaming giant Netflix.

ELEMENT AI AIMS FOR FURTHER PARTNERSHIP WITH S. KOREAN FIRMS

Element AI, a Canadian startup for artificial intelligence-powered software solutions, aims to join hands with more South Korean companies to help them adopt its cutting-edge technology, company executives said Nov. 19.

"Element AI was founded on the belief that AI should help people and machines work smarter, together," Co-founder Nicolas Chapados told reporters in Seoul, adding that it is Element AI's goal to help companies tackle challenges of taking AI from the prototype phase to production.

Element AI, which opened a Seoul office in 2018, has so far raised USD 253 million in two rounds of funding globally, the company said.

In 2017, Element AI established a USD 45

million joint fund with major conglomerates that includes top mobile carrier SK Telecom Co., the country's No. 1 carmaker Hyundai Motor Co. and Hanwha Asset Management.

"South Korea is one of the most ambitious markets in adopting AI, and Hanwha Asset Management's investment and our entry into Korea were an important milestone as we continue to expand our presence across the Asia Pacific region," Senior Vice President Philippe Beaudoin said.

In May 2019, Element AI also signed an MOU with Shinhan Financial Group to work together in accelerating Shinhan Financial Group's AI transformation, officials said.

UMICORE SIGNS INVESTMENT CONTRACT WORTH USD 100 MILLION

A global storage battery maker, Umicore, headquartered in Brussels, Belgium, signed an investment contract worth USD 100 million with South Chungcheong Province on Nov. 12.

Umicore, which has already moved into Cheonan general industrial complex, unveiled its plans to scale up its facilities in Korea under the five year investment pact.

The Belgium battery maker is one of the world's top players in cathode materials market,

hiring over 1,700 employees. It earned KRW 4.3 trillion in sales last year alone.

If all goes as planned, the effect on production inducement and value-added creation is estimated to be at KRW 800 billion and KRW 200 billion respectively. The investment also appears to create import substitution which helps the province save as much as KRW 1.8 trillion over the next five years.

Trade & Commerce

S. KOREA EYES STRIKING FTAS WITH 12 MORE COUNTRIES BY 2022

South Korea's trade ministry said Nov. 21 it plans to strike free trade agreements (FTAs) with 12 more countries by 2022, which will further allow Asia's No. 4 economy to expand its presence covering around 90 percent of the world's combined gross domestic product with its FTAs.

"Amid growing protectionism around the globe, and growing tension between the United States and China, South Korea will focus efforts on penetrating into new markets," Trade Minis-

ter Yoo Myung-hee said during a meeting with officials from trade-related organizations.

South Korea, which has implemented or struck 18 sets of FTAs with 58 countries as of November, said it plans to expand the network to cover a whopping 70 countries by the end of 2022.

When completed, South Korea will have a free trade network to cover around 90 percent of the world's combined GDP.

S. KOREA'S TRADE WITH ASEAN NATIONS UP TWENTYFOLD SINCE '80S

South Korea's trade with Southeast Asian countries soared around twentyfold this year compared to the 1980s, data showed Nov. 24, as they emerged as major trading partners of Asia's No. 4 economy.

The combined exports to the 10 members of ASEAN reached USD 80 billion over the January-October period of 2019, according to the Ministry of Trade, Industry and Energy and the Korea International Trade Association.

Its imports from the countries reached USD

47.4 billion, indicating that South Korea enjoyed a trade surplus of USD 32.6 billion.

In 2018, South Korea's combined exports to the members reached USD 100 billion, with the trade surplus hitting USD 40 billion.

The latest figures are significant as South Korea's exports to ASEAN members reached around USD 3.9 billion in 1989, with imports standing at around USD 4.1 billion, indicating trade jumped around twentyfold through last year.

ASIA-PACIFIC TRADE DEAL TO IMPROVE S. KOREA'S EXPORTS ENVIRONMENT: MINISTER

A mega Asia-Pacific trade pact will improve South Korea's exports environment, the country's industry ministry said Nov. 5.

The Regional Comprehensive Economic Partnership (RCEP) will improve South Korean companies' access to markets in the region, according to Sung Yun-mo, minister of trade, industry and energy, in a meeting with officials and business leaders.

His comments came a day after South Korea, China, Japan and their 12 other regional partners

reached a deal on the pact in Bangkok as part of annual regional meetings hosted by ASEAN.

The agreement involves Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Thailand, Singapore and Vietnam, as well as Australia and New Zealand. The RCEP will herald a mega economic bloc that accounts for half of the world's population and one-third of the total gross domestic product across the globe.

Industry

S. KOREA TO BUILD 1ST SMART CITY IN BUSAN BY 2024

South Korea has begun construction of a major "smart city" Nov. 24 in its southern port of Busan, where all infrastructure facilities will be maintained and controlled based on big data collected through internet of things sensors.

President Moon Jae-in attended the groundbreaking ceremony for the Busan Eco Delta Smart City (EDC), along with several ASEAN leaders, under the slogan, "Smart City Together With ASEAN."

To be built on a 2.8-square-kilometer area of land in western Busan by 2024, the smart city is expected to serve as a cluster for five innovative projects.

Big data, the internet of things, artificial intelligence (AI) and robots will be utilized to improve the quality of residents' lives and tackle urbanization challenges, according to the Ministry of Land, Infrastructure and Transport.

Government & Policy

MOON EYES 'PEOPLE-CENTERED INCLUSIVE' TIES BETWEEN ASEAN, S. KOREA

South Korean President Moon Jae-in presented a three-point vision Nov. 25 for partnerships between his country and the Association of Southeast Asian Nations (ASEAN), attending the CEO Summit here held on the sidelines of their special summit to mark the 30th anniversary of dialogue relations.

Moon stressed the importance of expanding people-to-people exchanges for "people-centered inclusive cooperation" as he delivered a keynote speech at the session attended by around 500 businessmen and government officials from South Korea and ASEAN members.

"Secondly, win-win prosperity and innovative growth" is necessary in response to the Fourth In-

dustrial Revolution, he added.

He pointed out that the New Southern Policy Business Cooperation Center to be set up next year will serve as a cornerstone for promoting South Korean firms' launch of businesses in ASEAN countries and enhancing the competitiveness of ASEAN companies.

He also emphasized the importance of strengthening connectivity in order to take bilateral economic relations to the next level.

Moon also reaffirmed South Korea's commitment to supporting the construction of infrastructure in ASEAN on the basis of its strengths in the transportation, energy and smart city fields.

Trends and Outlook of Korea's Semiconductor Industry

The world's semiconductor sales revenue has grown exponentially from USD 292.5 billion in 2016 to USD 410.4 billion in 2018, and the industry seems to be maintaining its strong growth. By 2023, the market value is forecast to increase to USD 446.9 billion.

The global semiconductor industry is set to continue its robust growth well into the next decade as semiconductors are becoming essential technology enablers for the upcoming 4th industrial revolution. With rising demand for artificial intelligence and big data analysis, the industry, driven mainly by the memory semiconductor business, is predicted to show steep growth reaching an annual average growth rate of 6.4 percent by 2021.

The market for NAND Flash, in particular, is expected to grow 12.2 percent, the highest point. Automotive/industrial semiconductor vendors will also benefit from a surge in demand of over 10 percent annually, whereas the growth trajectory in telecommunications/data-processing seems to remain at the status quo. Fabless manufacturing, which is the design and sale of system semiconductor chips, keeps showing a steady growth (taking up over 20 percent of the market) and the same trend is found in the market for the IP cores.

In the coming decades, artificial intelligence (AI) will become the next game-changer, transforming every corner of our lives; the way we live, the way we work and the way we earn money thanks to emerging technologies such as self-driving cars, intelligent robots, bio/healthcare devices and Internet of Things (IoT). Automation and digital connectivity brought by these highly advanced technologies appear to result in even fiercer competition to make semiconductor products more efficient, compact, smarter and lighter while consuming less energy.

To meet the demand of our times, facing a new era of artificial intelligence in the 4th industrial revolution, Korea has long been working on catching up and further advancing its technology. As of 2018, the total output of the semiconductor industry in Korea amounted to USD 109.1 billion. The largest part of the revenue came from memory chips that accounts for almost 93 percent (or USD 101.6 billion) of the total.

Korea, highly competent in processing technology and ready to make swift decisions for future investment takes up over half of overall global market value. Being part of world's technological frontier, Korea is keeping distance from follower countries to remain competitive. Korea, which occupies over 63 percent of the world's memory chips market, has a lead in DRAM (72.3 percent) and NAND (49.5

percent) business.

<Table 1> Semiconductor market size in Korea

(Unit: 1 million / USD)

| Category | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|----------------------|--------|--------|---------|--------|--------|--------|---------|---------|
| Memory Semiconductor | 47,059 | 80,048 | 101,618 | 82,741 | 86,011 | 91,446 | 97,265 | 99,292 |
| (Share) | 88% | 92% | 93% | 95% | 92% | 92% | 92% | 93% |
| System Semiconductor | 6,394 | 6,840 | 7,544 | 4,167 | 7,158 | 8,141 | 8,615 | 8,043 |
| (Share) | 12% | 8% | 7% | 5% | 8% | 8% | 8% | 7% |
| Total | 53,453 | 86,888 | 109,162 | 86,908 | 93,169 | 99,587 | 105,880 | 107,335 |

*Source: IHS March 2019

Korea is the second largest semiconductor producer (taking up 21.5 percent of the market share) behind the United States and spends the most for semiconductor manufacturing equipment (USD 34.5 billion in 2017).

Korea's semiconductor exports totaled USD 97.9 billion in 2017, demonstrating that semiconductors are the most valuable source of income for Korea. On top of that, Korea is the world's No. 1 memory semiconductor exporter, dominating over 60 percent of the global market.

Technically, semiconductor producers in Korea are further advancing new technologies and processing platforms that include nanoscale materials (e.g. nanocrystal), high speed semiconductor devices utilizing III-V semiconductor materials and Low k ultra-thin films based upon RF plasma polymerized aniline.

With the implementation of a new processing system that covers both microfabrication (through the steps of pre-processing to miniaturize structures into microscale) and the fan-Out Wafer Level Package at the post-processing (FIWLP) stage, these semiconductor manufacturers have started to well appreciate the technologies for processing, equipment/facilities and raw materials.

Putting greater efforts into advancing microfabrication in the memory semiconductor industry, they began to establish a new production base near suburban areas to serve as the world's biggest semiconductor clusters.

By securing original technology formidable enough to beat the current fad, the intelligent semiconductor transformer (IST), in its performance or in energy consumption level, Korea is now planning to take a leadership role in the future market for CMOS + materials based super intelligence image sensors and ultra-energy efficient IST, while leapfrogging over technology powerhouses through further improved IST architecture engineering, a key to AI/nano-processors.

Based upon next generation intelligent semiconductor technology, major players in Korea will become more competent in the Fabless industry, continuing to develop emerging technologies to be commercially viable—unmanned mobility, augmented reality, big data—mobile, high-tech robotic engineering, bio/ healthcare, energy, so-called “smarter consumer electronic products (that digitally talk to one another in a household network)” and “smart cities”—all of which require advanced semiconductors as inputs.

Consistent enhancements of prior technologies in the assembly lines enabling small businesses involved to become global pacesetters, in addition to the preoccupation of intellectual property for new technologies will help them widen the technology gap with followers like China.

These semiconductor giants in Korea will form a closer collaborative network with market suppliers, ensuring that all the entities engaged, small or large, can secure three main technologies (architecture, materials, fabrication) to embrace a win-win ecosystem, where next generation intelligent semiconductor technologies can emerge from.

With a vast pool of M.A. or Ph.D. level engineers, they'll run academia-led pilot study projects through which Korea can make a swift move to secure IST core technologies in advance.

By An Ki-hyun

Director

Korea Semiconductor Industry Association

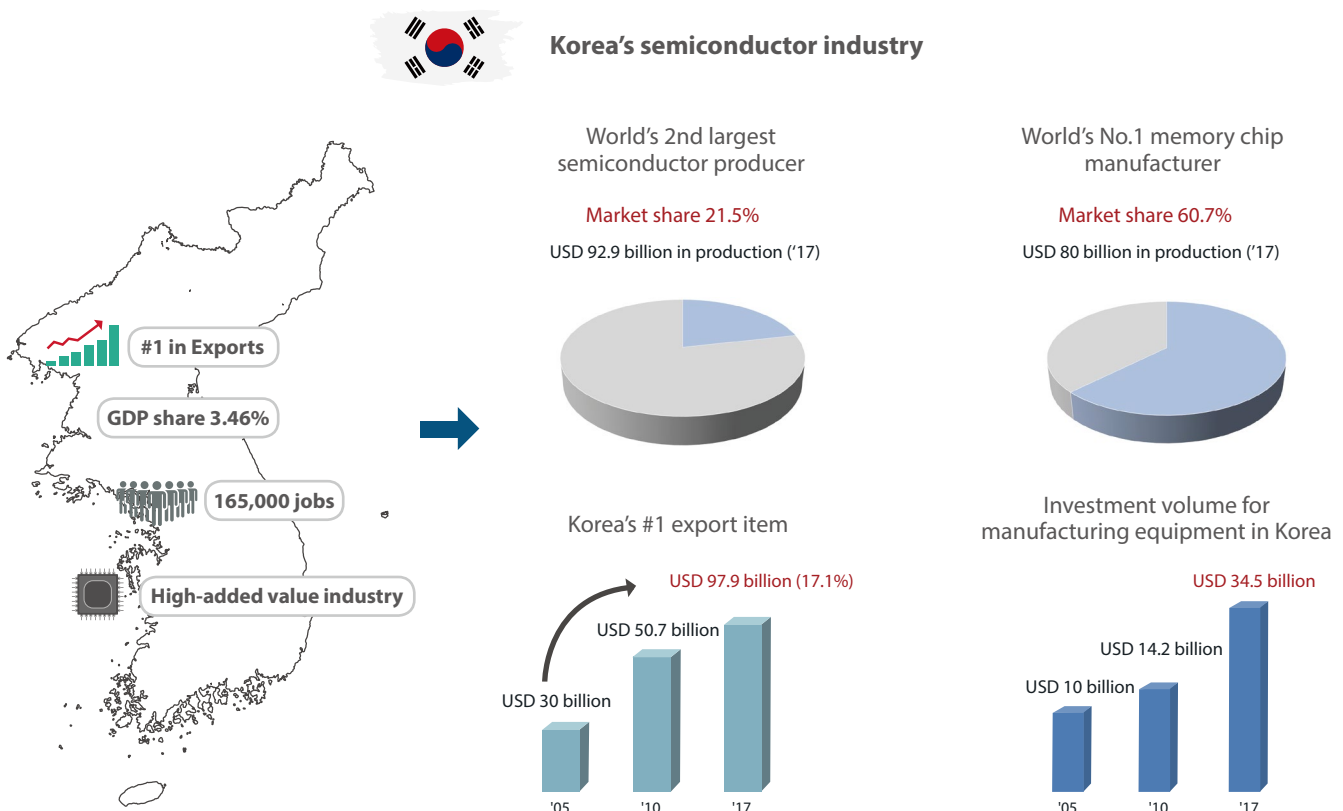
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**The opinions expressed in this article are the author's own and do not reflect the views of KOTRA.*

(Korea's semiconductor industry) a main driver of national economic growth:

Total output 6.7% ('16), employment 165,000 ('17), GDP share 3.46% ('16), export volume USD 97.9 billion ('17)

One of Korea's flagship industries creating jobs and investment opportunities in the midst of economic slowdown



*Source: IHS 2018, Statistics Korea 2017, Korea International Trade Association, IC Insights 2018

Goal of Creating Global Semiconductor Production Base by 2025

- Gyeonggi Province has formulated support plans for semiconductor development following SK hynix and Samsung's decisions to invest in semiconductor manufacturing facilities in the province
- The Gyeonggi Semiconductor Cluster is expected to be created by 2030
 - Combining Samsung's Giheung, Hwaseong, and Pyeongtaek Plants with SK hynix's Icheon and Yongin Plants
 - The goal is to become a global semiconductor production powerhouse with 84,000 employees working on up to 19 production lines
- The semiconductor industry is expected to have a considerable influence on future economic growth and job creation in Korea
 - Gyeonggi Province plans to bolster support and is organizing a task force to create the Yongin Mutual Growth Cluster



In response to SK hynix's decision to invest KRW 122 trillion in the Yongin Semiconductor Cluster and Samsung's announcement of its plan to invest KRW 133 trillion into system semiconductors, Gyeonggi Province established support plans to actively encourage their investments.

According to an announcement released on May 15, Gyeonggi Province has begun preparations for a long-term support plan for the semiconductor industry by organizing a task force and establishing a mutually beneficial plan for cooperation based on the expectation that the semiconductor industry will have a considerable influence on the future of Korea's economic stability.

Research conducted by Gyeonggi Province revealed that nearly half (43.3%) of last year's domestic semiconductor export volume, USD 54.8 billion out of a total USD 126.7 billion, was attributable to companies based in the province. This is because roughly 64.3% of domestic semiconductor companies are based in Gyeonggi Province. According to the Korea Semiconductor Industry Association, Gyeonggi Province is the region with the most semiconductor companies in Korea with 162 out of a total of 252 companies. This number is three times greater than the 50 companies of second-place Seoul.

Gyeonggi Province currently accommodates: the Samsung Electronics' Giheung and Hwaseong Plants; the Samsung Semiconductor Plant 1 in Pyeongtaek, which is located in the Godeok International Industrial Complex; and the

SK hynix Semiconductor Complex in Icheon. A total of 41,000 employees are working on 10 lines at the Samsung Electronics Giheung and Hwaseong Plants, 4,000 employees on a line in Pyeongtaek Plant 1, and 18,000 employees on two lines in the SK hynix Icheon Plant.

With construction of the SK hynix Yongin Plant as well as operation of the Samsung Semiconductor Pyeongtaek Plant 2 and the SK hynix Icheon M16 Plant starting in March next year, the Gyeonggi Semiconductor Cluster is expected to be fully formed by 2030, when it is projected to become a base for global semiconductor production with 84,000 employees working on up to 19 lines.

Additionally, the Gyeonggi Yongin Platform City that Gyeonggi Province and Yongin City agreed to jointly develop is expected to accelerate the creation of the Gyeonggi Semiconductor Cluster. The Gyeonggi Yongin Platform City will be a self-sufficient urban area equipped with state-of-the-art industrial, commercial, residential, cultural, and welfare facilities on a 2.7-square-kilometer site extending through Bojeong-dong, Mabuk-dong, and Singal-dong in Giheung-gu, Yongin City. The area already has robust industrial infrastructure accommodating the headquarters of major pharmaceutical companies such as Green Cross and Il Yang Pharmaceutical, as well as their manufacturing and R&D facilities, and the nearby Mabuk R&D Complex where nine companies, including Hyundai Mobis, and the Hyundai Technology Research Center are located. In this respect, Gyeonggi Province expects synergies to be realized through the Gyeonggi Yongin Platform City and the Yongin Semiconductor Cluster, where SK hynix recently decided to locate its plant.

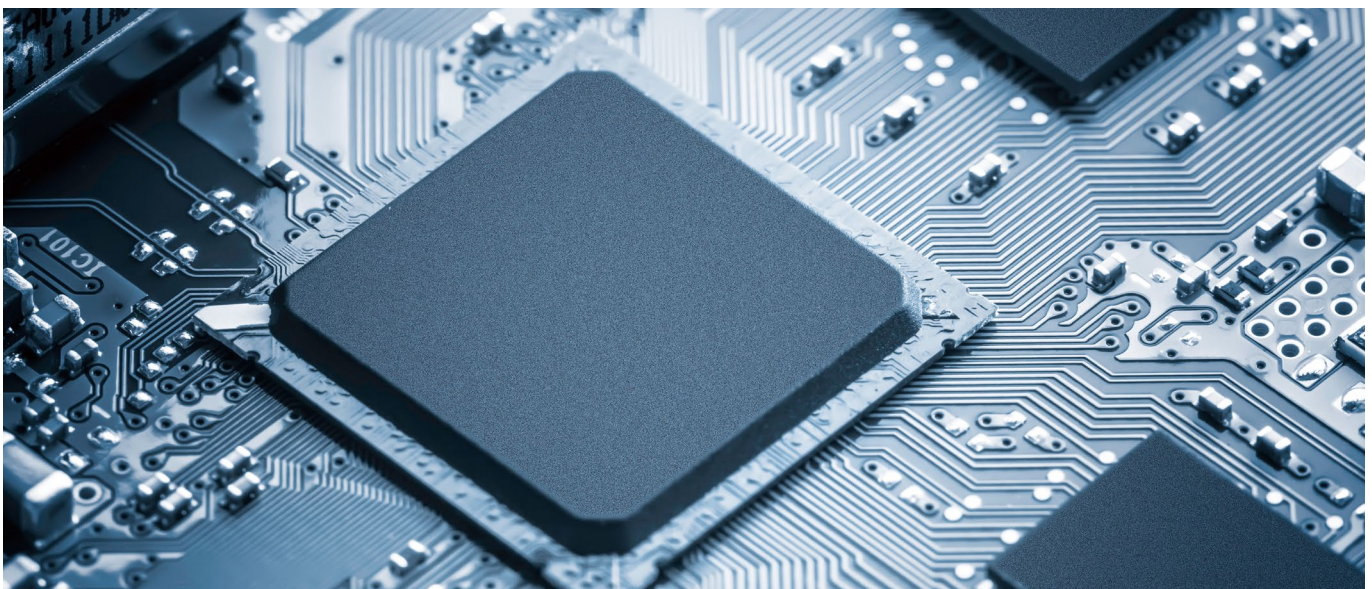
Gyeonggi Province will support the successful creation of the Gyeonggi Semiconductor Cluster by all available means and also establish additional support measures.

On April 17, Gyeonggi Province held a Gyeonggi Joint

Support Group meeting, led by the Vice Governor for Administration 2 and the Vice Governor of Peace, in which 11 departments participated. At this meeting, the province decided to operate a one-stop intensive support system in order to accelerate the authorization of the use of agricultural lands and mountain areas for the expansion of infrastructure, such as electrical lines, waterworks, and roads. In addition, a semiconductor industry task force was organized within the Industrial Policy Division that will support authorization work. Gyeonggi Province is also considering plans to transform the task force into a standing organization through the administrative reorganization scheduled in July and province-wide promotion of the creation of the semiconductor cluster, because it is expected that the cluster will have significantly positive effects on job creation and the revitalization of the local economy.

Gyeonggi Province and SK hynix are discussing ways in which to cooperate so as to ensure the successful development of the Yongin Semiconductor Cluster. The province plans to both establish the Mutual Growth Cooperation Center, equipped with entrepreneurial research spaces and education facilities for both large companies and SMEs in the Yongin Semiconductor Cluster, and to create a mutual growth fund to support companies that have innovative technologies related to semiconductor equipment, materials, and parts.

Park Shin-whoan, Gyeonggi Province Assistant Governor for Economy and Labor, stated: “The semiconductor industry has had a significant impact on the creation of high-quality jobs, economic growth, and in bolstering the competitiveness of domestic companies. In this sense, it is very important to successfully create the Gyeonggi Semiconductor Cluster. Gyeonggi Province, in order to prevent its support from being focused on just a few companies, is seeking a multifaceted approach to create an industrial cluster for shared growth, where large companies and SMEs can flourish together.”

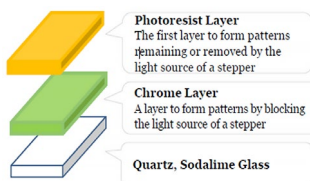


Source: Gyeonggi-do Provincial Office (<https://english.gg.go.kr>, May 17, 2019)

Invest Korea Market Place

Invest Korea Market Place (IKMP) is an online business matching platform available on Invest KOREA's website with information on over 280 Korean companies seeking to partner with foreign investors. This month, KOTRA Express introduces some outstanding companies in Korea's semiconductor sector.

COMPANY A



Binary blank mask:
Low-grade QZ Soda-lime

| Investment Requirement | | Company Profile | |
|-----------------------------|-----------------|---------------------------------|---------------------------------------|
| Amount | USD 2.5 million | Patents and certificates | Apparatus for inspecting blank mask |
| Investment Structure | All available | Financial Performance | (Sales) USD 0.05 million (in 2017.1H) |

Investment Highlights

1. Cleaning Technology to remove foreign substances: The existence of fine foreign substances causes fatal defects in the whole product. The company has secured not only cleaning technology to resolve this, but also process conditions that prevent the occurrence of stains in the process of drying after cleaning.
2. Photoresist Coating Technology: This technology increases coating quality by using spin- and slit-coating methods to minimize the amount of a photoresist used. Moreover, in the process of spin coating, the thickness difference in the middle and edge parts of the glass can be adjusted and thus the coating can be done within a deviation of 5%
3. Regeneration Technology: Usually, blank masks shall be used within three months after manufacturing, which increases the amount in stock. However, the company's products can be reused with regeneration and photoresist removal technologies.

COMPANY B



AEGIS Series, Based on innovative
2D imaging technology

| Investment Requirement | | Company Profile | |
|-----------------------------|---------------|---------------------------------|--|
| Amount | USD 8 million | Patents and certificates | Completed registration of 15 patents and application for three patents related to the development and manufacture of patterned semiconductor wafer image inspection device |
| Investment Structure | Minority | Major Clients | SK hynix, etc. |

Investment Highlights

The company specializes in the development and manufacture of patterned semiconductor wafer defect inspection equipment. It first succeeded in localization in Korea in 2014 and was acknowledged for its technical power through joint development with Fraunhofer IPMS-CNT in Germany, the world's top semiconductor device manufacturing technology powerhouse.

COMPANY C



eWEM-MS500
IoT/Cybersecurity

| Investment Requirement | | Company Profile | |
|-----------------------------|------------------------------------|---------------------------------|--|
| Amount | USD 10 million | Patents and certificates | 15 patents related to IoT SoC and 3D depth imaging SoC under registration in S. Korea; application for eight patents pending |
| Investment Structure | Minority (Financial investment) | Financial Performance | (Sales) USD 0.04 million (in 2016) |

Investment Highlights

The company has four highest security levels required to ensure the security of IoT devices: secure booting and storage, symmetric encryption, and asymmetric encryption. Because the individual chips can implement security functions, additional co-processors are not necessary to realize high-performance security.

For more information, please visit the IKMP page on www.investkorea.org.

5-Year Plan for Innovative Growth by SMEs

Still lingering is the dark shadow of the export restrictions that the Japanese government imposed last August, Korean government officials as well as business people are searching very hard to find effective ways to overcome once and for the obstacles in trade. The Korean government initially set out the list of 100 strategically crucial commodities that should be supplied locally, with the list being chosen according to its industrial importance, substitutability, and the particular country of dependence.

Upon reading the list, it was easy to find that the government was putting extra emphasis on six key industries, namely semiconductors, automobiles, display, electric and electronic products, machineries and metals, and basic chemical products. Among the list of the 100 products, the government esteems that 20 items could be supplied fully within one year, and the rest be readily provided in five years. All of these daunting government projects are termed as programs for industrial innovation, and they require massive investments.

The government plans to inject KRW 7.8 trillion in a 7-year period for domestic substitution, as well as an additional KRW 2.5 trillion in encouraging M&A of technologically advanced companies. Also, the government is willing to provide preferential support for technology transfer and direct investment from abroad. The 2020 budget allocates KRW 24.9 trillion for R&D investment, up 17.3% up from the year before. The first priority is given to the local supply of the key industrial materials and parts, which were usually imported from abroad. Another key area for R&D investment is the so-called DNA projects, which is an acronym for data, 5G network and artificial intelligence. Also, the budget is targeting the innovation of the Big-3 industries, namely bio-health, future smart car, and system semi-conductor.

No one can degrade the government program as futile or needless. But there are two critical questions that should be asked before its implementation. First is whether the amount set out in the government budget is enough. The KRW 10.3 trillion package involved seems to be a big sum, but won't be large enough to carry out the seven-year plan. It would definitely require much more funds for the multi-year projects; perhaps an amount twice or three times bigger may be required to carry out the program. Besides, the tax revenues for 2019 began to fall short of the initial plan, while the government budget is running a serious deficit on a record scale, making it more difficult to channel resources to the targeted areas without damaging fiscal soundness. Therefore, financing through public sources is becoming more difficult, and funding through private sources becomes inevitable. The other key question at hand is who should take the control of industrial innovation. Bureaucrats in the government lack professional expertise in the area of industrial commercial innovation. If government officials take command in innovation policy, the chances are very high of wasting

precious resources without much of a tangible outcome. These two critical challenges, namely financing and taking control with full responsibility, are the crux of the innovation policy to its success.

The solution to this is fairly simple. The private business sector, not the bureaucrats, should take the helm of innovation. The initiative as well as the responsibility for all of the innovation projects should be put in the hands of the private sector, only with a proper reviewing system in the public body. The incentive for innovation should be given not to the bureaucrats but to the business sector. As all the fruits of innovation should be reaped only by the business innovators, the private sector should take all responsibility of the funding and the associated risks. The private business sector could cooperate with such public entities as the SME cooperatives, chambers of commerce or universities. The government can just facilitate the financing through various guaranteeing systems, and reduce the costs and barriers to the available funds. Also, the government can allow increased access to public research institutions when deemed necessary.

In this regard, it seems more than appropriate for the government to launch a five-year plan to help support the private sectors' systematic efforts at industrial innovation. In the five-year plan, the government should set out, above anything else, a priority framework by which the government support would be provided step-wise to strategic fields of innovation. Another important element in the plan should be long-term programs to foster research in science and technology, as well as education, which are the perennial sources of innovation. Also, it should include comprehensive policies to allow SMEs to structurally get more competitive and efficient. Acknowledging that Korean SMEs are too undersized to become competitive, the policy of encouraging voluntary M&A among SMEs seems ever more urgent. Legal matters regarding share protection under M&A, distributing mechanism for profits and dividends, and matters regarding bequeathal and etc., should be carefully addressed in the promotional framework. It is very clear that the Chaebol system does not work for Korea anymore, and the time has arrived for SMEs. It is also clear that innovation should be the source of continued job creation and economic growth. If this is clear, then why not pour all our resources and capabilities to the innovative growth of SMEs?



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** The opinions expressed in this article are the author's own and do not reflect the views of KOTRA.*

ONE-ON-ONE WITH NOBUYA TAKASUGI

- *Honorary Ambassador of Foreign Investment Promotion for Korea*
- *Former Chairman & CEO, Fuji Xerox Korea*
- *Former President of the Seoul Japan Club*



KOTRA Express sits down with Nobuya Takasugi, Honorary Ambassador of Foreign Investment Promotion for Korea, to hear more about his experience doing business here and his hopes for Korea and Japan relations.

On the back of his experience as former Chairman & CEO of Fuji Xerox Korea and former president of the Seoul Japan Club (SJC), Nobuya Takasugi was appointed last year by the Ministry of Trade Industry & Energy as an Honorary Ambassador of Foreign Investment Promotion for Korea to promote Korea's investment environment to Japanese investors and companies.

Takasugi joined Fuji Xerox in 1966 after graduating from Waseda University, and at 33 years of age, he took on a leadership role at the company's headquarters following a training course in the U.S. and Canada. After many years at the company and spearheading Fuji's Korea office, he retired in 2008 and was subsequently recruited by major Korean law firm Kim & Chang as an executive advisor. Later, he assumed the position of president at the Seoul Japan Club (SJC)—the equivalent of the Japanese Chamber of Commerce in Korea, and was also appointed as a civil member of the National Economic Advisory Council, serving as an economic advisor to the late Korean President Roh Moo-hyun. With such extensive experience behind him, he finally left Korea for his home country, Japan, in late 2017.

When asked about how Korea's business environment has changed during his stay, Takasugi says that three major paradigm shifts took place, moving the Korean economy toward modernization, globalization and an environment

open to new business models. The first paradigm shift happened in the 1960s when GDP per capita stood at a mere USD 80. After the Korean War, the government concentrated on building infrastructure such as highways and dams with financial support from the U.S. and Japan, laying the foundation for realizing the country's rapid economic growth, dubbed as the "Miracle on the Han River."

The second paradigm shift occurred during the 1997-98 Asian financial crisis, coinciding with the time when Takasugi's company sent him to Korea. He explains that during this period, the Korean government changed the economic indicator from GNP to GDP, intending to increase domestic mass production, attract foreign capital and ease regulations. As a result, the country experienced an inflow of foreign capital, allowing Fuji Xerox Korea to raise the share of Japanese capital from 50 to 100 percent. Thus, Takasugi was able to focus on managing Fuji Xerox Korea, namely on matters such as labor-management, adopting modern marketing methods, and establishing production lines.

The third shift took place during the global financial crisis in 2008. He says that Samsung, LG, Hyundai, Posco and other Korean manufacturers of smartphones, automobiles, televisions and etc. partnered with Japanese parts and materials companies, resulting in great performance and success. Takasugi says such cases prove the importance of

partnership and cooperation between the two countries for co-prosperity. He also emphasizes the importance of Korea's efforts to attract foreign investment for the growth of the Korean economy. He mentions that Korea is currently facing a fourth paradigm shift in the tides of the 4th Industrial Revolution, as well as societal trends like low birth rate and population aging. As always, the Korean economy is expected to mature into a more flexible, business-friendly and globalized market after riding out the current changes underway.

When asked for some suggestions on strengthening collaboration between Korea and Japan, Takasugi says it is critical for the two countries, as geographical neighbors, to work together for mutual economic benefits aside from the diplomatic issues at hand. He says that Korea and Japan share common values like democracy and the market economy, while also possessing their own unique advantages. Taking smartphones as an example, he says Korea's strength lies in design and performance while Japan's strength is in the quality of parts; if the two countries can combine their strong points, they will be able to create a win-win cooperation model.

To this end, he proposes six specific, feasible solutions from a forward-looking standpoint. The first is to continue running sports exchange or quality community events as part of grass roots gatherings led by the younger generation in both countries. The second is to share more insight and information to overcome common social issues that plague both countries such as low birth rate, aging population and human resource development. Third, he suggests creating a

regional platform to work closely together to fight against environmental problems including marine pollution, yellow dust and fine particulate matter. The fourth is to seek ways to cooperate with each other to further integrate the energy business into a green growth framework. Fifth, he recommends making a concerted effort to consistently push for global scale projects such as energy exploration in a third nation. Lastly, he proposes the formation of a bilateral free trade bloc to maximize the economic benefits for both Korea and Japan.

Takasugi stresses that the countries and their private sectors must avoid being swayed by political and diplomatic difficulties, but rather, reflect on how they can merge each other's strengths for the greater benefit. He ends by saying, "Both Japan and Korea need to stand together to keep working on building our friendship economically and culturally," and adds, "I think now is the time to learn lessons from history which tells us to 'put yourself into the other's position' or 'sincere friendship binds our people' while we endure through these hard times."

By Grace Park

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Global Company Component Localization Project

Project Overview

→ Purpose: To establish a basis for mutually beneficial cooperation between and joint investments by SMEs of Gyeonggi Province and global companies through the localization of key technologies.

Target and Content Support

- Eligibility: Gyeonggi SMEs seeking to engage with global companies
- Target sectors: Semiconductors/display, automotive/sensors, AI, IoT, robotics, etc.

■ Support contents: Component-localization technologies, QMS consulting

- Component-localization support: Up to KRW 100 million per enterprise (corporate share: 20% or higher), differentiated support depending on evaluation
- QMS consulting: Up to KRW 3 million per enterprise (corporate shares: none)

Application Method and Procedure

■ Application method: When announcing component-localization support projects, attach necessary documents with the relevant application form and apply either online or offline (send to: Gyeonggi Techno Park)

Procedure



Global Business Matching Project

Project Overview

■ Promote matching projects with foreign corporations to improve global capacities of SMEs in the province and to find potential investors

Gyeonggi SMES and Overseas Company Exchange Events

■ Promote interactions between visiting foreign companies and Gyeonggi SMEs in connection with events hosted by embassy commercial attachés

Operate Baltic Business Support Desk

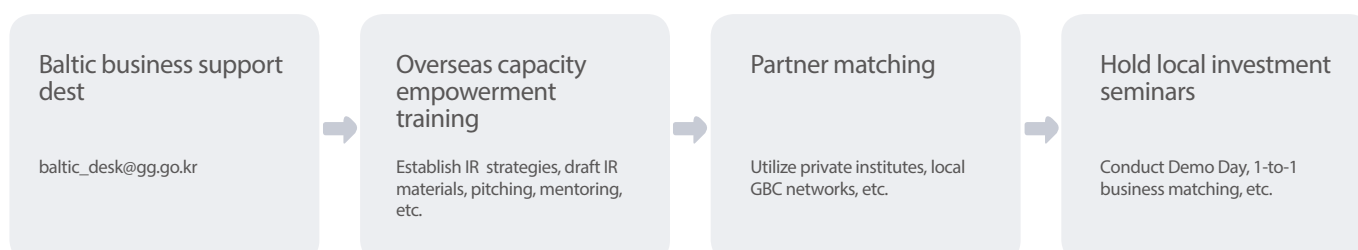
■ Support inter-regional entry of companies from Estonia, Latvia and Gyeonggi

Gyeonggi Baltic Desk



Pursue strengthening of global capacities for SMEs

■ Support for overseas IR training and local activities for SMEs of the province





Bulgogi

Despite its name, which means “fire-meat,” Bulgogi is popular for its soft texture and mild yet distinctive taste. The secret lies in the careful preparation process of cutting, tenderizing, and marinating the meat. It is a healthy dish as well as a tasty one: the marinade of soy sauce and sugar suppresses the formation of unhealthy cholesterol oxidation products (COPs), and its other ingredients are healthy as well, containing a range of key vitamins and beneficial organic compounds which aid digestion. Although a meat dish, it is generally eaten in a vegetable wrap, making it a nutritionally balanced meal.

Bulgogi is the most famous and beloved of Korean beef dishes. Its texture is tender and sweet, and people generally become devoted to it after tasting it just once. The literal translation of Bulgogi is “fire-meat” (bul-gogi). Its origins can be traced back to the Koguryo period (BC 37-AD 668). The people of Koguryo used to have a beef dish called maekjok, which was prepared by marinating skewered beef in soy sauce and garlic and grilling it over a fire. The recipe travelled to China, and gained a reputation as something of a delicacy. During the Six Dynasties Period, Gan Bao recorded in his book, *In Search of the Supernatural*: “Maekjok is a foreign dish, but the Chinese enjoy it greatly, and always serve it at parties hosted by the wealthy or high-ranking.”

When Buddhism was adopted as the state religion during the 4th century, meat dishes became less common in Korea, as Buddhism strictly prohibits the taking of life. During the 13th century, the practice of eating meat was revived following the Mongol invasions. For the nomadic Mongols, meat was a staple food, and the culture of Korea was naturally influenced by their customs. In the capital city of Kaesong, a centre of international trade and commerce, various meat dishes gained popularity. In time, this revival led to the appearance of a beef dish reserved for the royal palace called nobiani, which later became known as Bulgogi.¹

1) Myeong-jong Yoo, *Images of Korea: 12 cultural symbols showing the true inside of Korea* (Seoul: Discovery Media, 2006), 18.

The unique taste of Bulgogi has appealed to people from many different countries. The secret of its taste lies in the cooking process and the preparation of the meat. Traditionally, the tender and less fatty portion of sirloin or short ribs have been used for Bulgogi. The fat and the tendons are carefully removed from the meat. To tenderize the beef, one gently pats the lean meat with the back of a knife. During this process of cutting and tenderizing, the meat becomes much softer and the marinating is more effective as a result. The marinade consists of pear juice and rice wine (red wine can also be used). During the marinating process, the meat is

softened by enzymes, making it easier to digest. The meat is then combined with a mixture of soy sauce, honey (or sugar), chopped spring onion, minced garlic and ginger, powdered sesame, pepper, and sesame oil. After twelve hours the meat is ready to be grilled or sautéed in a pan without oil. Since Bulgogi is marinated before it is grilled, no other sauce needs to be prepared. The grilled meat has a mild yet distinctive taste. Research has shown that marinating meat in sugar and soy sauce before grilling is better for one's health. In June 2006, the Journal of Agriculture and Food Chemistry, published by the American Chemical Society, released findings showing that cooking meat with sugar and soy sauce suppresses the formation of cholesterol oxidation products (COP). These are generally formed when food containing a high level of cholesterol is heated or cooked. It is known that an excessive quantity of COPs can damage cells in the body and cause heart disease or cancer.

In order to research the effects of marinated meat and the formation of COPs, a team of researchers at Taiwan's Fujian University prepared a sample of pork and hard-boiled egg in three different marinades, the first using soy sauce, the second using sugar, and the third using a combination of both. According to their research, when meat is marinated in soy sauce or sugar, the formation of COPs decreases. The role of the sugar was found to be particularly important. Professor Chen, who led the research team, explained that the sugar and soy sauce marinade produce a browning reaction product which acts as an anti-oxidant, neutralizing COPs. In addition, beneficial nutrients contained in soy sauce, such as isoflavones, also suppress the formation of COPs. This proves that marinated meat dishes are not only tasty, but good for one's health as well.²

2) H.W. Lee and others, "Formation of Cholesterol Oxidation Products in Marinated Foods during Heating," Journal of Agriculture and Food Chemistry 54 (2006): 4873-4879.



It should also be noted that while the marinade used for Bulgogi contains soy sauce and sugar, the spring onion, garlic, ginger, and sesame oil are also very healthy ingredients. Not only do they counteract the odor of the meat, as well as tenderizing it and giving it a pleasant flavor, but they also enhance its health benefits. For example, sesame oil contains many beneficial unsaturated fatty acids such as linoleic acid, which helps suppress cholesterol. Sesame itself contains acids which suppress cholesterol and assist bowel movement. It also contains high levels of calcium, iron, and Vitamin B1 and B2. Garlic helps reduce cholesterol and total fat in the liver and blood serum. The allicin contained in it has an antibacterial effect, helping the production of digestive enzymes in the gastric juices. It also assists the intestinal movements and overall digestion. Bulgogi is therefore suitable even for those with weak digestive systems, such as the old or very young. The ssam is the finishing touch in the preparation of Bulgogi. Ssam is a kind of vegetable wrap, made with vegetable leaves such as lettuce, sesame, or crown daisy, and is generally eaten with ssamjang sauce. The ssamjang consists of soybean paste (made with fermented soybeans) and hot pepper. It is therefore an excellent fermented food, and contributes both to the taste and the nutritional value of the ssam. As the meat is eaten in a vegetable wrap, moreover, the meal is nutritionally balanced, and so counteracts the onset of arterial diseases, hypertension, and cancer. If its taste, nutritional value, and health benefits are considered together, there is no better meat dish than Bulgogi.



Health Information Exchange (HIE) Project

Leading improvements in the health and medical service environment with technologies of the Fourth Industrial Revolution



What is the Health Information Exchange (HIE) project? It refers to a service that, for the purpose of ensuring continuity of medical treatment, enables the medical records of a patient who has given consent to disclose his/her personal information to be safely transferred to and from a medical institution electronically so that the doctor can refer to the records when treating the patient.

The Social Security Information Service (SSIS) of Korea through the HIE project is building a document repository for storing and managing HIE documents, applying the HIE program needed for medical institutions to use the HIE service in Electronic Medical Records (EMR) and improving the function, and building and operating an information security system to help the public (patients) and medical institutions safely and effectively use the HIE system. For the public (patients), the HIE project reduces medical costs by minimizing duplicate medical imaging tests and examinations and removes the trouble of having to deliver the medical records themselves while healthcare personnel can benefit

by referring to the patient's medical records and use them to improve the continuity of medical treatment and to assist decision-making. Medical institutions can guarantee patients' safety by preventing drug accidents and responding to emergency situations and can improve the quality of medical service by strengthening the network of cooperative medical diagnosis among participating medical institutions. On top of the SSIS, various related agencies are involved in the HIE project as it is an initiative made across the healthcare sector to electronically exchange patients' medical records among medical institutions.

Beginning from building base document repositories and designating participating medical institutions in 2017, the HIE project established 13 document repositories across Korea and expanded the scope to 33 regional base medical institutions in 2019. Especially noteworthy is that in the same year, a nationwide network was built through the designation of regional base medical institutions in Incheon, Gangwon and Jeju. Usability is being improved by linking the network with a pilot system for patient referral and returning

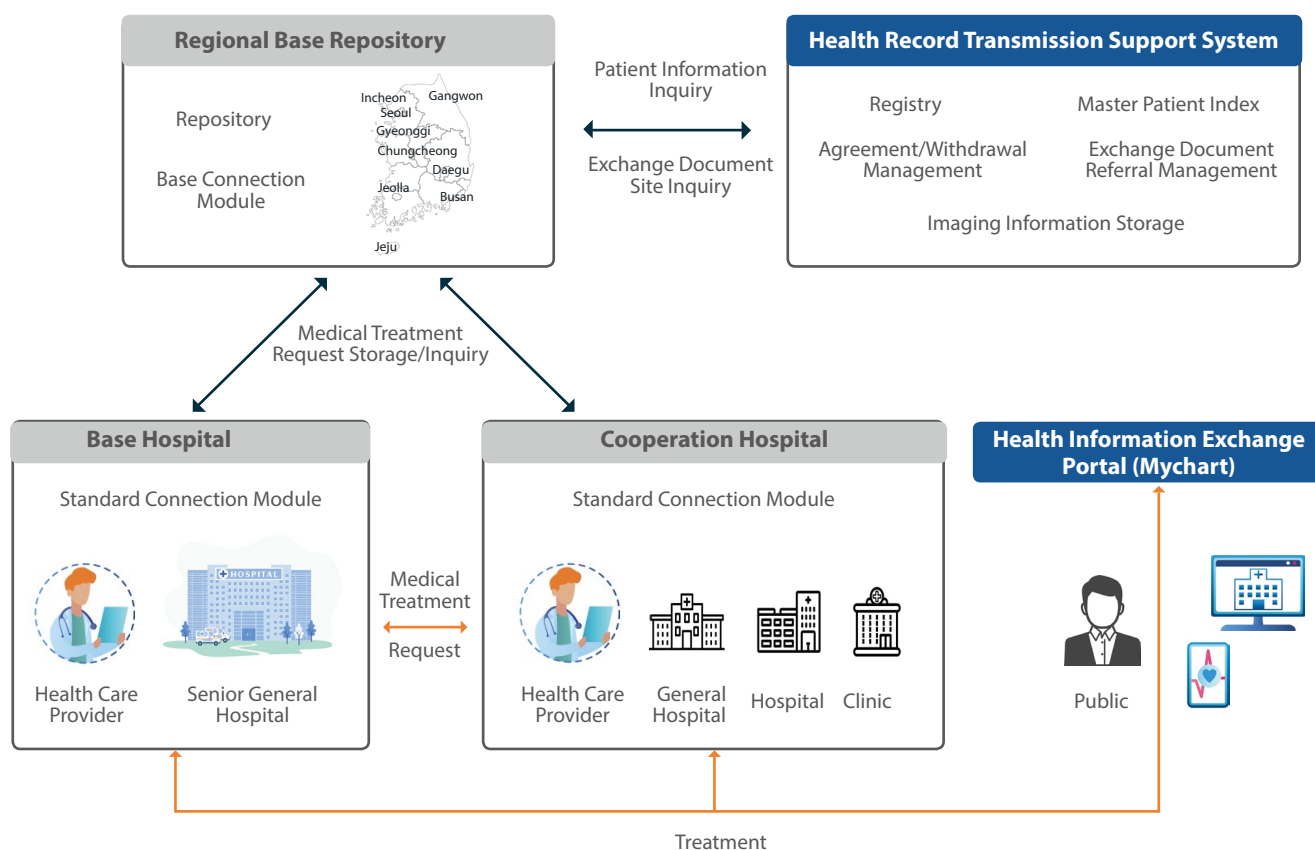
between participating institutions, with the Emergency Patient Transfer Support System and with the Personalized-Hospital Information System (P-HIS). In addition, the health information exchange feature was incorporated in 40 EMR solutions of Korea's 33 EMR companies so that medical institutions can readily incorporate the standard connection (interface) module to their EMR system.

In order to help medical institutions successfully build their HIE system, the HIE project supports the effort by providing development training, distributing guidelines and offering technical assistance and is ensuring the interoperability of HIE programs by putting in place a procedure for confirming participation. In operating the project, SSIS issues notifications and guidelines to assist medical institutions in efficiently using the HIE system and is providing user-oriented services by regularly convening a consultative body tasked with discussing major issues and making decisions. In addition, through the HIE project, HIE-related statistics of medical institutions are compiled and managed to continuously assist medical institutions in their performance analysis and daily operation. Through the HIS project,

documents including the patient referral document, the patient returning document, the imaging information report, and the Care Record Summary (CRS) are provided. In case of imaging information in particular, Computed Tomography (CT) or Magnetic Resonance Imaging (MRI) images that comply with the Digital Imaging and Communications in Medicine (DICOM) standard can be electronically forwarded, and a web viewer is provided to allow users to view the imaging information without installing a separate system. Medical personnel can quickly provide medical care and guarantee a continuity in medical treatment by checking CRS and referring to the medical history when treating a previous patient.

SSIS is operating "mychart" as a part of the HIE project to enhance use accessibility. Hereafter, the HIE project aims to provide a stable service and an incentive by operating an EMR certification system, reflecting the results of medical treatment quality evaluations and supporting medical fees, and is planning to provide a customized service for promoting public health through connection with the Personal Health Record (PHR).

Health Information Exchange System



Every month, KOTRA Express provides answers to some frequently asked questions submitted by foreign-invested companies in Korea and potential investors.

Safety guidelines for foreign residents in Korea



What should we do when natural or man-made disasters occur in Korea?



The following guidelines are tips for staying safe in the occurrence of natural/social disasters, and for responding to problems faced in everyday life.

1. Natural Disasters

1) Typhoon

Q) What should we do after a typhoon?

A) - When you get home after evacuation, do not enter your house until you can be sure everything is in good order and safe.

- Contact community service centers or government agencies nearby if you find any facilities damaged by the storm (buildings, water supply system, barricades, roads etc.).

- Document any property damage with photographs.

- Do not walk or drive around flood waters. Broken roads or bridges may injure you.

- Stand away from river banks in case a river bursts and overflows onto the surrounding land.

- When trapped by a flood, avoid wading in the flood water. Call 119 to ask for help.

Q) What should we do when vehicles are caught in a flood?

A) Avoid driving through waterlogged roads or underpass. Leave immediately.

If your car has been partially or fully submerged in floodwater, do not turn on the engine.

2) Heavy Rainfall

Q) What should we do after heavy rainfall?

A) - Keep away from flood water. Dead animal bodies or spilled oil may have washed into your space especially when the water level starts to go down.

- Do not use tap water or drinking water filled in a container until you have checked for contamination.

- Due to potential threats from food poisoning, do not eat food ingredients soaked up water.

- Be sure to turn off electricity and gas appliances

at the main breaker. Call the Korea Gas Safety Corporation (KGS: 1544-4500) or the Korea Electricity Safety Corporation (KESC: 1588-7500) and never use the appliances until authorities say it is safe to do so.

- Do not use open flames in case there are gas leaks. Open the windows to help dry and ventilate the house.

- Raise up the crops drowned by floods. To pump out water from damaged farmland, wash out muddy debris and sewage stuck onto the plants and conduct a post-flood pest control to prevent insect infestation.

3) Heatwave

Q) How can we survive a heatwave without air-conditioning?

A) Find shelter and stay out of the sun during peak hours, especially when you have to go out in the heat or are unable to keep cool at home. You can click on the official community webpage or get information on the nearest shelters through the 'Emergency Ready App'.

Q) When are heatwave alerts likely to be issued?

A) The warning system consists of two levels: Level 1 and Level 2.

The minimum level alert (Level 1) is issued when the temperature high for the day exceeds 33 degrees Celsius and lasts over the next two days. If there is a high chance that a heatwave intensifies and the high exceeds 35 degrees Celsius for the next two days, a Level 2 alert is issued.

2. Social Disaster Management

1) Fire

Q) What are the steps for using a fire extinguisher?

A) When using it indoors, stand against the door for safe evacuation.

1. Hold the extinguisher tight and pull the pin to break the tamper seal.
2. Move and point the nozzle at the base of the fire.
3. Squeeze the handle to release the agent.
4. Sweep from side to side until the fire is out.

Q) What should we do when clothes catch on fire?

A) To prevent smoke inhalation and facial burns,

1. You must stay still.
2. Cover your face with both hands to avoid facial injury.
3. Lie down on the ground.
4. Roll onto the ground to suppress the flames.

2) Traffic Accident

Q) How can we escape from a sinking car?

A) - Unbuckle your seatbelt. Take off your shoes and clothes to lighten your weight in the water for swimming.

- Grab anything that will help you float and swim through the broken window as fast as possible. Or, break the window open with a tool to shatter the glass.
- If you've failed to escape, remain calm and wait for the water to fill the vehicle until the pressure is equalized, letting you open the door to exit.
- Take several slow, deep breaths and hold on right before you get out of the car.

3) Fine Particulate Matter

Q) Where can we access information on air quality?

A) AirKorea (an official webpage to provide real time access to national air quality information: www.airkorea.or.kr)

- Korea Meteorological Administration
- Outdoor weather signs
- Mobile app 'Local Air Quality Information' (Android OS, iOS)

Q) How can we protect ourselves from fine dust?

| | Those vulnerable to effects of air pollution | Ordinary people |
|----------------------|--|--|
| Moderate | Do not necessarily have to avoid outdoor activities, but stay cautious. | |
| Bad | Keep your activity levels slow. Asthmatic patients who stay outdoors are recommended to use asthma inhalers to help reduce exposure to allergens. | Keep your activity levels slow. Indoor activities are recommended especially when you feel uncomfortable with symptoms such as irritation of the eyes and throat or coughing. |
| Extremely bad | Avoid outdoor activities. Stay indoors and follow your doctor's directions. | Keep your activity levels slow. Indoor activities are recommended especially when you experience discomfort such as eyes or throat irritation or coughing. |

3. Safety Precautions for Everyday Life

Q) What are the steps for treating food poisoning?

A) 1. Visit the nearest hospital if you have any signs or symptoms of food poisoning such as vomiting and diarrhea. Follow hospital instructions.

2. To avoid dehydration, drink enough water to replace the minerals that you lose with diarrhea.
3. Avoid acidic beverages such as juice or soft drinks until you feel better. Allow your stomach to settle.
4. Ease back into eating. Gradually begin to eat when you feel ready, but start with bland, easy-to-digest foods.
5. If anyone in your family or otherwise who has shared foods with you develop similar symptoms, contact the nearest community health center.

Source: Safekorea.go.kr

Please visit www.safekorea.go.kr for more information.

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