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Editor's Note

As the editor of this book, I present "The Seoul Institute Research Abstracts 2020", a collection of English summaries for all the research studies published in 2020. As the Seoul Institute (SI) covers a variety of urban planning disciplines, this book includes brief explanations of our policy solutions on many types of urban problems.

The Seoul Institute was established in 1992 (as the Seoul Development Institute) to formulate long-term growth plans and provide policy solutions for various problems in Seoul. For more than 20 years, the SI has provided guidance and pointed towards a sustainable future. The SI, as a prominent think tank with about 80 PhDs on staff, has conducted comprehensive policy research in a range of different areas.

I believe that our expertise on urban planning can help city governments around the world resolve problems common to many cities. If any part of this book intrigues you and your colleagues, we have achieved the aim of this publication.

I appreciate the opportunity to share our research outcomes with you, and sincerely hope that our knowledge will assist cities all over the world as we all strive for a sustainable future. This book will also provide potential opportunities for collaborative research with you and your institution. For further information, please do not hesitate to contact me at miree21@si.re.kr.

Best regards,

Miree Byun

01 Urban Planning

Development of Urban Neighborhood Regeneration Model by Type of Superblock Residential Area in Seoul

Hee-Ji Lim · Eun-Jung Yang

The residential area in Seoul had some problems created before the 1980s. Naturally-occupied residential area is with insufficient infrastructure and bad housing, and even in the case of the superblock was also created at the expense of green space and various infrastructure for the quantitative supply of housing. In this regard, we proposed regeneration plans for the superblock, which occupies as a representative residential area occupying 64% of Seoul. The regeneration model of the small residential superblock is to secure the walkway while securing parks, parking lots and community facilities. Practical implementation plans should be linked to district unit planning by designating the area of street housing maintenance projects and introducing “Type of Residential Area Management District Unit Plan” including “Park Common Block” and “Green Belt”. The Regeneration model of the apartment complex Superblock is to communicate and connect with the surrounding small residential area and to form a semi-open complex. Considering the size of the surroundings, the block is divided based on the basic module of 100×150m, and roads, parks, and cultural facilities that should be basically provided within the 30% of the total area of the site. Social consensus and improvement of capacity ratio system are needed, and the introduction of the “Block-by-Block complex-use Plan” system to mix usages by block should be discussed together.

Strengthening the Role and Capabilities for Autonomous Districts' Urban Planning in the Decentralized Era

Jae-Seob Yang · Min-Chul Shin · Young-Kwoun Ban

The purpose of this study is to understand the management conditions of urban planning in the autonomous districts of Seoul in the era of low growth and decentralization, and to find suggestions regarding the direction of strengthening the urban planning capacabilities of autonomous districts. For this purpose, the issues of decentralization in urban planning, management conditions and operational problems for autonomous districts of Seoul, as well as case studies of London and Tokyo were analyzsed, and the opinions of experts were surveyed. The main findings and implications are as follows.

First, the authority of urban planning in autonomous districts of Seoul is considerably insufficient compared to the general cities. Seoul's urban planning is entirely the Seoul Metropolitan Government(SMG)'s authority and the autonomous district can not exercise any urban planning authority autonomously.

Second, in order to reflect the changing urban planning conditions in the decentralization era, the SMG needs to be in charge of integrated urban management at the metropolitan level, and it is desirable for autonomous districts to carry out urban planning tasks related to their residents' lives at the community level.

Third, it is necessary to establish a mid- to long-term roadmap and step-by-step to expand the authority for urban planning by autonomous districts of Seoul, in consideration of the characteristics of Seoul as a metropolitan city.

Fourth, in order to expand authority in urban planning for autonomous districts of Seoul, it is necessary to strengthen the expertise of urban planning through the establishment of an independent "Urban Planning Review Group" and to operate the urban master plan for autonomous districts.

Research on the Effectiveness of Building Code Deregulation on the Areas for Facilitated Urban Regeneration

Seoyeon Yoon · Ji-Yeon Oh

Since the late 2000s, the urban regeneration paradigm has shifted from redevelopment projects that involved large-scale demolition of old low-rise residential areas to multiple small-scale residential regeneration programs that focus on small parcels of land. Since 2013, regeneration programs have been diversified by introducing policies and regulations to promote small-scale residential regeneration programs such as the facilitated urban regeneration program. The facilitated urban regeneration program launched in 2015 and since its inception has focused first and foremost on developing the region's public infrastructure and as a secondary aim has facilitated the private sector to restore residential areas. However, the investment from the private sector is at a low ebb.

Although the Urban Regeneration Act includes mitigation provisions for floor area ratio, building to land ratio, maximum height by block-unit, and parking lot requirements, it has been pointed out that these mitigation provisions are vague and ineffective.

This research aims to figure out whether the mitigation provisions of the Urban Regeneration Act work as designed and facilitate private sector development, we also wish to quantify the effectiveness of these provisions. Examining the public records shows that there have been no deregulation cases based on the Urban Regeneration Act and therefore the deregulation of factors like floor area ratio, building to land ratio, maximum height by block-unit, and parking lot requirements for each parcels has, to this point in time, not worked in practice. In addition, a simulation on the impact of deregulation of floor area ratio in Jangwi-dong, one of the facilitated urban regeneration area, showed that around 36.1% of the area could not even maintain the current floor area ratio because of poor road conditions,

area parcel scale, and topographic features. Only 37.8% of area is able to secure the additional 50% floor area ratio, when applying the advantage of the deregulation of floor area ratio.

Further consideration of meaningful deregulation of the building code in addition to deregulation of the floor area ratio, building to land ratio, maximum height by block-unit, and parking lot requirements is required in order to facilitate the private sector in restoring small scale residential areas in the facilitated urban Area. In addition, a specialized approach is required for areas where the road conditions, area parcel scale, and topographic features are not attractive to private developers. Finally, parcel scale planning and management is required in the facilitated urban area regeneration programs and the public role in areas with poor infrastructure and more difficulty for parcel improvement should be given special attention.

A Study on the Establishment of an Urban Land-use Classification System for Effective Zoning Operations

Joo-Il Lee · Hye-Rim Yoon

Zoning is a method of realizing a land-use plan (a.k.a. masterplan) which sets detailed regulations for use of the land. Regulations concerning appropriate land use provide the basis in the zoning system for realization of “desirable land use”, such as protecting a calm residential area through the exclusion of hazardous use or revitalizing a town center through the introduction of mixed use.

Korea has a dual zoning system. The “National Land Planning and Utilization Law”(hereafter referred to as the “National Planning Law”) designates zoning district, density, height, allowable use, etc. The “Building Law”, classify the use of buildings and determines allowable uses of building. However, the “Building Law” mainly targets buildings only, and is basically concerned with regulations regarding the structure and safety of buildings. Therefore, there is a lack of sufficient consideration of city management and management of the surrounding environment in the zoning system.

In this study, we introduce an urban land-use classification system (draft) based on behaviour that could be incorporated into the “National Planning Law” in the long term. In other words, we have devised a land-use classification system that meets the goals of the zoning system and should be integrated into the “National Planning Law”.

In addition, we suggest a method of ensuring autonomy such that local governments could use the zoning system to respond promptly and flexibly to the emergence of new uses.

The urban land-use classification system proposed in this study is based on the characteristics of Seoul. In order to devise an urban land-use classification system that can be universally applied to the entire country, it is necessary to investigate

various building types and land use behaviours of local cities with various characteristics, and to conduct sufficient consultations with the Ministry of Land, Infrastructure and Transport.

Location Analysis of Shared Offices and Tenant Firms in Seoul

Sun-Wung Kim · Nam-Jong Jang · Eunjoo Oh · Gain Lee · Kyung-In Choi

Since the 21st Century, the number of shared offices has increased rapidly in many cities of the world, along with the appearance of sharing economy. Since the expansion of shared offices has occurred recently in Seoul, the exact numbers and locational behavior of shared offices are not identified in reality.

In this study, interviews were performed with representatives and service managers of shared offices. Also, the survey was fulfilled with the representative managers of the tenant firms. The questions on the representatives dealt with the number and year of branch offices, members of tenant firms, their strong points, their future plans, etc. The information on the survey of tenant offices such as the reason for the choice of this firm, the types of office size, future plan, etc. was also required.

It was observed that the city's role is too early to make a decision about its involvement in the private market, due to the existing controversial reasoning. It is recommended to improve the operation of public administrative service in better locations in metropolitan sub-regions, to share the information of the city's investor network system with the private, and to improve the official registration system of the firm in the government organization.

A Study on the Diagnosis of Major Projects and Future Plan of Smart City in Seoul

Hee-Ji Lim · Jaeuk-Wook Ju · Seo-Yeon Yoon · Jung-Min Yu · Young-Jun Han · Hwa-yon Jin

The Seoul Metropolitan Government(SMG)'s smart city project is promoting more than 40 projects in 10 departments. Seoul City's smart city projects were divided into six areas: big data, new industrial hubs and jobs, transportation, environment, regeneration, and pilot projects, and major projects were selected. In the field of big data, which is the core of smart city, the public data is completely opened and private data and real-time data linkage/utilization business. In the field of new industrial bases and jobs, the Yangjae new industrial base business was selected, specializing in the AI(Artificial Intelligence) and big data industries, which are the core of smart cities. The transportation sector selected Sangam autonomous driving test bed project and the environment sector also selected Magok energy self-reliance smart energy city development project. In the field of regeneration, the G Valley New Industrial Base Project was selected to develop the existing traditional industrial complex into a new ICT-oriented hub, and Magok was selected for the pilot project.

These six major projects can be divided into physical space unit convergence projects, data utilization projects, and new technology introduction test bed projects. It is important to have a master plan and implementation organization that can be created in the long term, and financial-investment and institutional improvement should be supported. The data utilization business should focus on actual policy utilization in the future and develop a data utilization platform. In the transportation and energy sector, single projects that are being promoted require deregulation and R&D linkages to introduce new technologies, and financial management to build related infrastructure and performance management to spread.

In order to promote the smart city project in Seoul, it is necessary reorganize the

infrastructure in terms of planning and realization. First of all, from the planning aspect, it is necessary to establish a master plan for each business unit and prepare a system from preparing a “Seoul City Smart City Master Plan” that encompasses individual projects. In addition, the contents of the “Smart City and Informatization Basic Plan” to be established in the future should be included in the “2040 Seoul Plan” to serve as an indicator for Seoul to establish itself as an important policy sector. It is also necessary to prepare a plan for performance management and continuous implementation considering the characteristics of each type. In terms of realization, a new framework should be established. It needs to be reorganized into an organization that can comprehensively respond to technological innovation, improve the legal system for utilizing innovative technologies, and make financial investments by the government and the SMG. The establishment of a regional action organization should also be accompanied.

New Directions for Housing Stock Management Policy in Seoul

Eun-Cheol Park · Hye-Rim Yoon

The housing policy of the Seoul Metropolitan Government focused on expanding the supply of new homes during the period of high growth. As a result, it preferred demolition and redevelopment to repairs and improvements for the purpose of increasing the housing stock in Seoul. However, the potential economic growth is slowing down today, and it is expected that the number of households is going to decrease after the mid-2030s, as is the population. Around 3.9% of total housing stock in Seoul consists of ageing stock whose administrative durability periods exceed their economic durability periods. If there is no supply of new homes in the future, this proportion will likely increase up to 5.7% in five years and up to 11.4% in 10 years. In the era of low growth, it is important that housing stock be reserved and managed properly, not only by providing newly-built houses, but also by promoting the quality of used houses.

In order to increase the durability of existing houses and promote voluntary improvements and renovations by homeowners, the housing stock management policy of Seoul city needs to follow three principles. First, the administrative durability periods of buildings should be gradually set to be equal to the economic durability periods. Second, the goal of housing stock management should be set up as the achievement of long-lasting buildings with a focus on health, safety, and habitability (incl. barrier-free design and energy efficiency). Third, the response and management for ageing stock should maintain a balance between point- and area-based approaches.

02 Transportation Planning

Effect on Expansion of Regional and Urban Railways and Strategy of the Seoul Metropolitan Government

Hyuk-Ryul Yoon · Youngbeom kim

Recently road congestion, environmental concerns, energy usage and resource depletion due to the increasing number of automobiles has meant that the attention on and importance of railroads are at an all time high. To reduce commute times and improve metropolitan transportation, the government is planning to expand the number of regional railways that serve new cities' transportation needs while continuing to support current urban railways in a balanced development plan based on creating efficient infrastructure.

At this time many of the railways that were previously planned have actually been implementing while many of the rail projects being pursued currently will be completed in the next 10 years and affect existing operating Seoul railways and buses. These railway projects, which will open before 2030, are expected to increase the number of railway passengers by about 2 million. As a result, it is expected that the city's public transportation system will change drastically in the next 10 to 20 years. In particular, the GTX (Great Train Express) will produce a paradigm shift that will bring about major changes to the metropolitan transportation system beyond simple improvements to transportation facilities and will completely change the existing public transportation system in Seoul.

If the number of railways in the Seoul metropolitan area is continuously increased, transportation problems in this area can be solved, but the existing Seoul public transportation system, which must finally accommodate the demand for additional railway capacity will have a critical impact, such as increased congestion.

While accommodating the additional demands on the railway system, it is expected that the infrastructure will have to accommodate various problems caused by the current congestion and the design of a single stations due to the laws and guidelines that relate to existing facilities in Seoul. Restrictions that exist due to the planning of current stations and routes are not reflecting their usage levels. The biggest problem faced is simply the “average peak rate”, which is a result of the underlying design of the current subway lines, being able to meet the peak demand. At this time the characteristics of each station, such as the level of congestion or level of station facilities, were not considered in their initial planning. In addition, the system has problems with efficiency and operation as it was designed without properly considering the adequacy and operation problems of extensions to the urban railway. What is more when planning additions to the urban railway network due consideration must be given to overlapping, existing public transportation services, such as buses.

This study comprehensively summarizes the Seoul Metropolitan Government(SMG)’s olicies related to railways in terms of the public transportation system and analyzes the problems that are occurring during the current operation of urban railroads and related factors. The city government’s presented ideas should be considered and implemented before it is too late for the SMG to build the railway network of the future. However, as railroad policy is pushed ahead faster than expected, the SMG has yet to make a detailed review of the aforementioned points, which is likely to cause more problems in the future. Accordingly, the SMG should organize its countermeasures and plan in detail the future direction of development to meet the growing needs of our public transportation system.

OD Estimation and Application Using Taxi DTG Data

Sun-Gwan Kim · Hyeon-Gyun Ki

Seoul has completed the installation of Digital Tacho Graph (DTG) onto all taxis in 2015. Although the DTG data is highly reliable data that reflects the use of taxis realistically, its use has been limited to checking traffic volume at the destination of passenger plane due to missing and erroneous spatial information and the fact that it is not installed in other areas except for Seoul. This study reviews the ways to utilize DTG data in the preparing statistics on taxi traffic volume as DTG data has become more stabilized gradually.

The number of DTG for Seoul taxis ranged from 1.1 million to 1.2 million per day. The amount was 1,273,971 in 2015 but it has been reduced by 1,159,775 daily in 2018. The data error rate has been gradually lowered from 9.2% in 2015, 7.2% in 2016, 6.5% in 2017 and 6.2% in 2018, suggesting that data has been stabilized. Among the types of error, the missing information about getting off accounted for the highest portion ranged from 3.4% to 6.1%. In particular, this type of error accounts for more than 50% of all errors. It is followed by missing information about getting on and off. It is found that 1.0%~1.2% of taxis' operating area is outside of Seoul.

As a result of comparison between DTG OD and Taxi OD, the DTG OD showed 1.91 million traffic volume while taxi OD showed 2.12 million as of 2016, showing 9.7% of difference. The distribution by district level is very similar for DTG OD and taxi OD, but in some districts, internal traffic volume ratio of taxi OD is found to be lower than that of DTG OD.

Since the DTG is currently installed on taxis in Seoul, scenarios were established for correction to make sure of DTG OD for traffic in Seoul and total taxi OD distribution. After the correction, the differences of traffic volume was reduced from 15.5%~12.7% to 9.1%~1.3%. The corrected value was used for the establishment of taxi OD in 2018.

Microscopic Evaluation of the Quality of Public Transportation Service by Region in Seoul

Gyeong-Sang Yoo · Seungjun Kim · Junhyoung Yeon · Jihan Kim

In this study, public transportation accessibility and mobility were evaluated microscopically. Public transport accessibility was evaluated by dividing the entire Seoul area into grid cells in unit of 100m. Public transport attribute data such as public transport facilities and routes available in each cell were collected and the accessibility index for each cell was calculated using such data. Mobility of public transportation by region was evaluated by analyzing travel time and the number of transfers required for moving between survey units of KOSTAT(Statistics Korea). Passenger car travel time was also analysed to determine competitiveness of public transportation in Seoul. Lastly, by identifying living service facilities that could be accessed within a unit time using public transportation, differences in convenience of living by region were examined. The methodology and analysis results of this study can be used to help us prepare public transport policies such as evaluating regional equity of public transport services, adjusting and establishing routes, and supplying auxiliary transport modes. In addition, results of this study can be used in various fields such as public transportation-centered urban planning and public transportation service information provision for citizens.

Big Data Analysis of Pedestrian Accidents in Seoul Using Deep Learning

Youngjun Han · Hasik Lee

Due to the application of various pedestrian-friendly policies, the number of pedestrian accidents in Seoul has decreased. However, the use of smart phones has changed the walking behaviour, and has worsened the pedestrian environment due to disruption of delivery motorcycles or electric scooters. As a result, the pedestrian accidents has abated, whereas the number of minor accidents has increased. A survey of walking behaviour among Seoul citizens indicated that 69.0% of pedestrians use smart phones while walking, and 44.9% and 23.6% of them watch a 'Video' or play a 'Game' respectively, which leads to vulnerable pedestrian behaviour. In order to reflect this change in pedestrian behaviour, we developed pedestrain big data including smart phone usage, and modelled pedestrian accidents using deep learning techniques. Compared with traditional linear regression, the developed model provides a better estimate of accident rate. We also predicted pedestrian accidents with respect to changes in future pedestrian environment, such as increasing the use of electric scooter. The framework of this study based on deep learning and big-data analysis may be applicable to other areas including prediction of traffic congestion or demand for public transit.

Developing an Accessibility Assessment Index for the Mobility Handicapped Using the Public Transportation of Seoul: A Focus on Metro Stations

Sinhae Lee · Chung-Han Ryu

The purpose of this study is to establish the mid-to-long-term plan for conducting an accessibility assessment to help the mobility handicapped in Seoul and to develop accessibility assessment indexes for the metro system and stations (including the area within a 500 meter radius).

In this study, we surveyed 50 key stakeholders who are mobility handicapped, resulting in the collection of 1,238 1st idea statements. By integrating the idea statements generated from previous studies related to accessibility for the mobility handicapped and the relevant certification index with these 1st idea statements, a total of 2,518 2nd idea statements were derived. After synthesizing and editing, the final statements were reduced to 65 items. 9 participants from a group of experts classified the final statements by similarity. 48 out of 50 participants who were in the focus group interviews rated the importance, measurability and urgency of the statements by priority. Classifications based on the similarity resulted in clustered statements, these were considered as the preliminary assessment indexes. Perception differences by type of mobility handicap and priority as well as the core contents of the assessment dimensions were identified through analysing the rated statements.

As a result, a total 26 accessibility assessment indexes for the Seoul metro and stations (including the area within a 500 meter radius) were derived, they consist of 7 assessment dimensions as follows: ‘Connection to exterior space’, ‘Convenience in interior space’, ‘Usefulness of interior service facility’, ‘Availability of facilities such as restroom and feeding room’, ‘Efficiency of information’, ‘Suitability of mobility aid system’, ‘Mobility safety’. At the same time, a priority list of 32 items

for improving the accessibility for the mobility handicapped using the Seoul metro was confirmed.

The Seoul Metropolitan Government(SMG) should develop an evaluation manual based on the 26 assessment indexes with 7 dimensions and detailed assessment indexes according to the type of mobility handicap. This manual will help to evaluate the Seoul metro's accessibility level for the mobility handicapped in the field. To achieve a gradual improvement in the Seoul metro's accessibility for the mobility handicapped, the SMG should set strategies based on the 32 priority list.

Derivation of Vulnerable Section of Public Transportation Services

Sang-Yeon Hong · Hyuk-Ryul Yoon · Gyeong-Sang Yoo · Jun-Hyoung Yeon

The average number of passengers using public transportation daily in Seoul is nearly 11 million. The quality of public transportation infrastructure in Seoul is considered to be on par with that of advanced cities overseas. Citizens expect better public transportation services, such as additional facilities at night.

Accordingly, it is necessary to identify the sections of Seoul's spatial and temporal public transportation that are still vulnerable and actively address their needs in public transportation policies. Since public transportation facilities have been linked mainly to economic efficiency, it is difficult to fully accommodate the citizens' travel needs and expectations based on current facilities and operations. Therefore, this study has analysed the various factors in Seoul, which depend on time and space, and discussed the implications for future public transportation policy.

03 Environmental Planning

A Study on Seasonal Particulate Matter(PM) Management to Prevent High Pollution Events

Yu-Jin Choi · Ki-Chul Choi · Seungmin Lee · Hye-Jin Lee

On the contrary to a decrease in the average annual PM2.5 concentrations over the last three years, the number of high PM2.5 event has increased in particular. Specifically, in March 2019, the PM2.5 advisory continued for seven days, and on March 5th, the daily average concentration reached 135μg/㎥.

The government has implemented emergency reduction measures since 2018 to cope with the high PM2.5 events. However, questions are being raised to the effect of current emergency reduction measures, which respond in a short period of one or two days of high PM2.5 occurred. Consequently, there is a need for new alternatives to cope up the high PM2.5 events.

Usually, high PM2.5 events occur frequently from late autumn to early spring. Considering the seasonal characteristics of the occurrences of high PM in Korea, it is considered necessary to introduce seasonal PM management system. In this study, the definition, aim, period, and measures for the seasonal PM management system derived from the expert forums, which comprised of about 20 experts in related fields were discussed and suggested.

Coping with Emerging High-impact Urban Disasters in Seoul

Sang-Young Shin · Kwonjoong Choh · Hang-Moon Cho · Jong-Seok Won · Chang-Woo Shon · Miree Byun · Sang-Gyoon Kim · Youn-Sang Lee

Recently, Seoul and Korea have experienced large-scale or newly emerging disasters frequently such as land slides, infectious diseases, earthquakes, and ferry sinks. Emerging high-impact urban disasters are difficult to prepare and respond because they are difficult to predict due to high levels of uncertainty and large-scale consequences once taking place. They are typically beyond usual public concerns and capacity. This study identifies emerging high-impact urban disasters in Seoul in the future and proposes policy directions to cope with such disasters.

First, the study discusses concepts of emerging high-impact urban disasters and various associated concepts. Criteria of high-impact disasters are also reviewed with existing institutions and policies.

Second, through past cases of urban disasters of Seoul and other metropolitan cities, the study analyses characteristics and trends of high-impact urban disasters. Also, the study looks through changes of urban conditions and the impacts on disaster risks in terms of urban spaces, socioeconomic changes, climate change, newly emerging technologies, and international situations.

Third, based on questionnaire survey data, the study analyzes perceptions of citizen and experts on emerging high-impact urban disasters.

Fourth, the study identifies possible emerging high-impact urban disasters in Seoul in the future. Such disasters are classified into two types: traditional high-impact disasters that have persistently taken place and are predicted to increase in future, and emerging urban disasters that are anticipated to take place in future in terms of changes of urban conditions and experiences of other metropolitan cities.

Fifth, the study proposes policy directions to cope with emerging high-impact

urban disasters in Seoul. As a basic directive concept, the study emphasizes to secure urban disaster resilience since the disasters are beyond usual capacity and resources due to unpredictability and uncertainty. Under the umbrella of urban resilience, the study proposes policy and institutional changes in terms of comprehensive disaster reduction capacities of urban spaces, crisis management systems, and information sharing and knowledge building.

Finally, the appendix shows evacuation simulations with the case study of large-scale disasters in a downtown subway station in Seoul and evaluates evacuation sufficiency.

A Proposal for Improving Incentives for Seoul's Green Building

Min-Kyeong Kim · Hyun-Jung Nam

Korea revised the Green Building Establishment Act in 2019 to enforce mandatory green building in the private sector from 2025 and expand it to small buildings from 2030. In addition, the plan is to strengthen the incentives for a stable policy environment. Seoul city government repealed the guidelines for environmentally friendly building designs that had been in effect since 2007 and has been applying the Seoul Green Building Design Standard since 2013. Further, since 2009, the Seoul city government has been providing incentives in the form of green building certification according to various rating systems, including Green Building, Building Energy Efficiency, and Zero Energy Building. These incentives have been launched over the past decade to compensate for the increase in initial construction costs and revitalize green buildings in response to concerns about a downturn in the construction market.

However, due to frequent changes in the system, low effectiveness, and low public awareness, performance has been considered insufficient. The Seoul city government has perceived a lack of institutional and economic incentives for green building and emphasized the need to promote green construction by finding additional incentives at the beginning of this year. Therefore, before mandating green building construction, it is necessary to find a policy to increase the incentive effect through provision of intensive support. Current incentives include relaxation of building regulations (floor area ratio and height) and acquisition in tax reduction, but there exists a risk in carrying out a design using the incentives when the benefits are uncertain. Therefore, the incentives must be improved to reflect the actual needs.

The Seoul city government needs to lead in systems and incentives to establish the design, construction, and operation plans for actual buildings and for residents

to create zero energy buildings in the future. To this end, systematic and accurate data should be gathered and analyzed to find effective ways to improve incentives that would reflect local characteristics. For example, in the case of supporting a 10% additional construction cost in addition to the existing benefits, the payback period for residential, non-residential, and business buildings was set at 9 years. In addition, application of building coverage ratio to residential building resulted in an 10-year payback period, and a 10 years' and 8 years' payback period, respectively was set when the standard for establishing parking in non-residential and business buildings was relaxed. The introduction of subsidies is generally accepted overseas, but Korea does not provide financial support for new buildings. Subsidies that lower the initial cost of construction can increase the incentive effect and serve as an attractive factor that can convince the owner through the provision of intensive support.

Structural Safety Management for Small-scale Buildings

Jin Park · Sang-Gyoon Kim

The collapse of several buildings has caused social anxiety about an aging building. Further, 46% of buildings in Seoul are over 30 years old. Therefore, structural safety management for small-scale buildings is an important issue in Seoul. Recently, with revision of the law, third-class facility was implemented and mandatory management was extended to small buildings. Legally, this means that the number of private buildings under mandatory management has been increased. Management of third-class facility includes designation, pre-inspection, designation decision, safety inspection, and maintenance. As third-class facility is newly implemented and the system is in progress for the first time, a complete work should be improved based on the implications of the overall process.

At present, the average number of potential third-class facilities is 1,000 in each autonomous district in Seoul. Priority standards need to be established for efficient designation and management of the third-class facility. Problems have been identified in the national building DB, which is called Seumteo. There is no data value or the entered value does not meet the building codes. Therefore, Seoul's building DB is needed to supplement the limitations of the national DB. Also, it is necessary to enhance the automatic linkage of facility management systems between Seoul and the nation.

Meaningful implications were found in the field study on pre-inspection. It was difficult to conduct pre-inspection due to closure of the entrance. It is necessary to send a notice to the owner, manager, or representative of the tenant, to inform them that the visit has not been carried out. Ultimately, administrative services are needed for appointments in advance between building managers and inspectors. In addition, it is necessary to set up a building representative in connection with the local manager for small buildings without a building manager. This saves the time

that is unnecessarily utilised during the pre-inspection process, and thus, efficient inspection can be performed.

Citizens have little awareness about pre-inspection, and the inspector is now guiding the purpose of the visit and the details of the inspection and seeking co-operation. Through public relations, supplementary measures should be taken together, such as raising public awareness of building safety management and providing means to enforce it. This needs to be improved because it is also connected with safety inspection after final designation of the third-class facility.

During pre-inspection, it is difficult to confirm because the main components are covered with internal and external finishing materials. The Seoul Metropolitan Government should prepare a criterion for the case so that there is no difference in the result grade for each inspector or building. If a building is in a vulnerable area or an accurate diagnosis is required, it is necessary to use a non-destructive inspection as a complementary means. There is a need to find ways to link building remodelling or interior work with safety inspections.

Public awareness about private building safety management should be improved. Self check should be allowed building owners and managers to be interested in the building and understand its condition. In particular, awareness about the necessity of building safety management should be extended to private building owners.

Improvements in Safety Management for Underground Facilities in Seoul

Suk-Min Lee · Hyung-Mi Yoon

Underground facilities are part of the basic infrastructure that directly affects the lives of Seoul's citizens. In addition, there is a growing demand for the Seoul Metropolitan Government(SMG) to take responsibility in the event of any accidents within the Underground system. Nevertheless, the SMG has a limited role in dealing with accidents at underground facilities managed by private companies.

The occurrence of underground facility accidents in Seoul not only leads to damage to citizens' lives and property, but can also inflict secondary damage such as drinking water interruption, power failure and communication paralysis, causing great inconvenience in daily life. In addition, safety management of underground facilities is very important because they include planning for large-scale disasters such as road sinking and casualties in the event of an explosion or fire in the underground facilities.

In this study, we want to find real improvements through analysis of the status of our underground facilities while also investigating cases of accidents, the current safety procedures and manuals, information systems related to underground facilities, as well as conducting interviews with officials who work in the system everyday.

The underground facilities subject to this study can be divided into seven major categories: water supply, sewage, electricity, telecommunications, gas, heat transport pipes, and utility tunnel.

The policy improvement plans are divided into ordinary safety management measures, enhancements to responsiveness in the event of an accident, and strengthening administrative organization for the management of underground facilities in Seoul. The ordinary safety management measures include safety

inspections for underground facilities, information management systems for underground facilities, and readjustment of related laws. Measures to improve the ability to respond in the event of an accident include strengthening the responsibility of the disaster control department, setting up and training for complex disaster scenarios, and rearranging the disaster response manuals.

In strengthening the administrative organization for the management of underground facilities, the government aims to draw up measures to strengthen the public-private working-level of co-operation and to enhance the role of the department currently in charge of underground safety affairs.

A Study on Publishing Local Energy Statistics of Seoul

Hang-Moon Cho · YunHae Lee

The weather conditions have a direct effect on cooling energy and heating energy consumption. Typical indicators are cooling degree and heating degree. For example, the coefficient of determination (square of correlation coefficient) between monthly heating day and monthly city gas consumption is as high as 0.87, and the determination coefficient between cooling degree and monthly power consumption is as high as 0.62.

The consumption of energy also shows a tendency to increase with the regional economic growth of Seoul. Gross Regional Domestic Product (GRDP) is a good indicator of the growth of the local economy. In this case, alternative indicators are needed to quickly identify economic conditions. Large retail store indexes are closely related to GRDP, so it is necessary to use economic indicators such as large retail store indexes. Therefore, it is desirable to identify various indicators affecting energy consumption.

It is also very important to express energy in accordance with national standards. Statistical units for each energy sources are expressed in their own units. In the case of petroleum products, they are expressed in terms of petroleum conversion tonnage (TOE : ton of oil equivalent) because product types are various and calorific values are different from each other.

When the energy supply statistics are written, the unit of energy unit shall comply with the National Standard Act and shall be applied from the year after revision and enforcement of the application of the energy conversion standard.

Seoul energy statistics should include not only energy data but also data on factors affecting energy consumption. Statistics on energy consumption in Seoul can not be prepared quickly, but energy supply statistics can be written relatively easily. Therefore, it is desirable to prepare it based on the provided by the energy provider.

Energy consumption statistics and energy supply statistics have different classification schemes. Energy supply statistics by energy source is recommended for the Seoul Energy Statistics, because statistics on energy supply by sector are not classified. Statistics on energy supply by sector shall be contained only partially.

The energy supply statistics are recorded as the sum of the energy consumption in terms of the final energy for each energy source. The energy supply statistics are recorded as the sum of the energy consumption of Seoul in terms of the final energy for each energy source.

The Seoul Energy Statistics contains energy supply data by sources such as electric power, city gas, petroleum products, and district heat energy. It contains various indicators affecting energy consumption include population statistics, economic and social statistics, building statistics, and weather statistics.

The most important characteristic of the Seoul Energy Statistics created through this study is the regional segmentation by Gu and the breakdown of the time by month. Current national statistics have a statistical lag time of about two years, but the Seoul Energy Statistics can be shortened to three to six months.

Policy Suggestions for Seoul's Climate Neutrality

Jung-Min Yu · In-Chang Hwang · Jeong-Ah Kim

Global mean temperature has risen to about 1℃ above its pre-industrial level and we are experiencing more severe and frequent extreme weather events. If we continue to emit greenhouse gases(GHG) at current levels, it is most likely that we will face irreversible climate by the end of the century. In order to avoid these climate risks, various national and local governments along with civil societies announced 'climate emergency' and are asking for more radical action.

Seoul has played a leading role in reducing GHG emissions and transforming conventional energy systems by initiating innovative climate policies such as One Less Nuclear Power Plant(2012), Seoul's Promise(2015), Solar City(2017). Despite many successful implementations of those policies, Seoul has been slow in achieving its climate goal of 40% emissions reduction by 2030. Furthermore, the city as a member of the C40 must join the global efforts to cap the global temperature rise at 1.5℃, this requires that our society is carbon neutral by 2050. This research aims to suggest key policies for achieving Seoul's carbon neutrality by 2050, these policies are based on a series of discussions that took place in the 'Climate Action Forum' (Nov. 2019~May 2020), which can be summarized as follows:

First, zero energy remodeling for existing building stock is major task if we are to meet the city's bold climate goal. Retrofitting public buildings including their welfare facilities needs to be accelerated. Along with strengthening the Building Retrofit Project(BRP) loan program, effective regulations such as an 'emission cap' and mandatory 'energy performance certificates' should be introduced.

Second, it is necessary to develop a roadmap to phase out ICE cars, starting with commercial vehicles. It is key to reduce the passenger car driving and to facilitate a transition to low-emission vehicles through more active traffic management

policies, such as mileage-based taxation, new carbon free zones, green traffic mileage etc. Restructuring urban road system for pedestrians, bicycle, and new modes of mobility is also important task.

Third, the city needs to reduce disposable products and encourage re-usable products to achieve the goal of no single-use plastic. In order to achieve the goal of zero inflammable waste to landfill, waste reuse should be increased and wastes that cannot be reused should be efficiently recovered to energy. In addition, re-and up-cycling centers need to be created at the district level to encourage the practice of reuse and repair.

Fourth, in order for Seoul to achieve 5GW of PV by 2050, it needs to convert almost all buildings to produce solar energy. PV should be mandated for public buildings and the current incentive scheme needs to be reformed to subsidize new technologies such as BIPV and light-weight PV systems. Incentives for fuel cells to be installed at buildings also need to be provided to allow them to be commercially viable. In addition, Seoul needs to promote new business models such as energy prosumer, virtual power plant, and demand response(DR).

Fifth, city's climate, energy, particulate matter policies need to be integrated into a single 'Emergency Plan for Climate Risk', this will entail significant organizational and budgetary reform. In particular, deputy mayor for climate change position needs to be created to oversee and coordinate climate policies that are currently conducted in a somewhat fragmentary way. The city needs to enhance its education and learning programs for city officials, citizens, and businesses so that they can actively participate in the city's diverse climate programs.

A Study on End of Life Management of PV Panels for Seoul

Min-Kyeong Kim · Hang-Moon Cho · Hyeon-Jung Nam

The Korean government has established the ‘Renewable Energy 3020 Roadmap’ as the core plan of the energy transition policy, and set a goal to achieve 36.5GW of photovoltaic power generation by 2030 to increase the share of renewable energy generation by 20%. As part of policy to cooperate the ‘Renewable Energy 3020’ project, the Seoul Metropolitan Government(SMG) is pursuing the ‘Solar City, Seoul’ projects. the SMG is promoting various photovoltaic projects with the goal of expanding and supplying 1GW, equivalent to the capacity of 1 nuclear power plant by 2022, and installing mini PV for 1 million households.

Since 2007, when the SMG began to expand PV supply, installed PV panel has increased drastically. Considering the life of PV system, it is expected that administrative demand for waste PV panels will begin to emerge from 2023 to 2025. However, despite the expansion of photovoltaic power generation, the management system and the government’s policy on waste panels are insufficient, causing confusion about the scope of work between organizations of the SMG. Specific guidance should be in place to address this.

In 2018, about 20 tons of waste PV panels were discharged from all over the country. The classification of PV panel as a waste is not clear, The lack of demolition-collection-disposal system has caused confusion among departments of the SMG. In addition, although regulations related to photovoltaic system installation are relatively clear, it is difficult to grasp the actual situation because the regulations on waste PV panels management are insufficient and data on PV panel inventory and waste PV recycle systems are not established. The amount of waste PV panels to be generated in Seoul by 2040 was estimated by considering the installed PV panels and future PV panels. The forecasted waste PV is about 1,000 panels per year by 2022, and starts to increase to more than 34,000 panels per year

from 2030. It is projected to be 420,000 in 2040.

The national PV recycling center will be completed in 2021. If the PV panel is included in as an EPR item, the producer is responsible for collection and disposal. The solar modules discharged as large wastes are collected at local governments and stored in storage areas, where PV producers transport them to recycling center.

The PV panels as a large waste must be collected by the local government and stored in a temporary storage site, which is then transported by the producer to the recycling center. In a typical large waste management system, when the emitter discharges large waste to the designated place, the municipality collects and disposes it directly or through a consignment company. The PV panel producer deposits funds in the Ministry of Environment, which must pay a deposit when the contractor processes the waste PV panels.

Long-term Strategy and Sectoral Approaches of Seoul for Achieving Carbon Neutrality by 2050

In-Chang Hwang · Ko-Un Kim · Jong-Rak Baek

The global community, including the United Nations Framework on Climate Change (UNFCCC) and C40, is currently making an effort to constrain global warming below an increase of 1.5℃ compared to the preindustrial level. According to climate scenarios, every country and city should achieve carbon neutrality (or net-zero emissions) by at least 2050 in order to meet the temperature target. Considering the importance of cities in terms of the levels of emissions and population exposure, city governments should take the initiative to reduce carbon emissions, rather than act as late movers. The Seoul Metropolitan Government (SMG) takes part in global efforts to achieve the temperature target. Citizens of Seoul also agree with the global target and support local actions to avoid the adverse impacts of climate change. Further, citizens require the SMG to take more stringent actions to address climate change.

This report presents the long-term strategy and sectoral approaches of Seoul toward achieving carbon neutrality by 2050. The city of Seoul will reduce its carbon emissions by 80% by 2050, compared to the level of emissions in 2005, through the 5G strategy: green building, green transport, green energy, green cycle, and green forest. The remaining carbon will be offset by carbon credit programs to achieve net-zero emissions by 2050. The main policy measures in the building sector include a cap and trade program on greenhouse gas emissions and the zero emissions buildings regulation. The city of Seoul plans to strengthen the currently initiated (in 2019) urban access regulation (e.g., Seoul Low Emission Zones(LEZ)) to curb carbon emissions in the transportation sector. The registration of conventional vehicles with internal combustion engine will be prohibited by 2035, and no vehicles other than zero-emission vehicles will have access to the

entire city by 2050. In the energy supply sector, the SMG will provide most of its electricity consumption via new and renewable energy sources, including energy generated by solar panels and hydrogen fuel cells, by 2050. Most of the carbon emissions in the waste management sector can be reduced via the current regulation on direct landfill disposal by 2025. Such strong actions taken by Seoul benefit the global community, since they contribute to net-zero emissions by an appropriate timeline, which is required to tackle climate change.

Seoul citizens will also benefit from the carbon neutrality policy, since it helps improve the quality of life in general. The climate policy of Seoul is expected to contribute to a substantial reduction of urban air pollution as well as carbon emissions. A huge investment in sectoral measures, including renewable energy sources, green remodeling, zero-emissions vehicles, carbon offset programs, and re-and-up-cycling, is required to achieve the goal. However, such an investment will help promote the growth of related industrial sectors in Seoul, resulting in quality jobs and economic activities (a so-called 'green new deal'). The strategy and approaches of Seoul also include equality aspects and governance issues, which are detailed in the report.

Development of an Evaluation Model for Regulatory Effectiveness to Reduce PM2.5 and its Application in Seoul

Sojin Lee · Suhan Ham

Environmental policies corresponding to “fine particulate matter (PM2.5)” typically regulate economic activity in attempts to reduce anthropogenic emissions. As these regulations often inconvenience citizens to a certain extent, it is necessary to evaluate their impacts before they are implemented. We developed an evaluation model to assess the impacts of these regulations on surface PM2.5 in Seoul using a meteorological model and air quality models. We attempted to account for the impacts of five-year meteorological variability on the effectiveness of the regulations.

It has been reported that air quality in Seoul has improved since the late 1990s due to various efforts by the national and local governments. However, PM2.5 in Seoul has fallen under the domestic annual PM2.5 standards over the past five years. We examined the monthly and hourly averages of PM2.5 using the urban air quality monitoring network in Seoul from January 2015 to March 2020. We found that high levels of PM2.5 occurred in wintertime during this period. Specifically, the average PM2.5 levels in March were the highest in 2017 and 2019.

We investigated that the main factors affecting the levels of PM2.5 are foreign and domestic air pollutant emissions and meteorological phenomena. Among meteorological phenomena, wind greatly affects the distribution of PM2.5. In this study, we analyzed the variability of PM2.5 in Seoul and selected Chinese cities according to the wind characteristics, and our results showed that the wind direction and wind speed substantially affected the surface levels of PM2.5 in these cities.

To forcus on the influence of meteorological phenomena, we conducted simulations of five-year wintertime PM2.5 using the constant anthropogenic emission inventories in East Asia. We found that the differences in monthly-averaged

PM2.5 in Seoul were as high as 13㎍/㎥, it was confirmed that these differences can offset the effects of the regulations. We also showed that the assessment of PM2.5 regulation can vary between years due to the different meteorological conditions.

This study suggests that weather variability should be accounted for when assessing the impact of PM2.5 regulations. We also described several limitations in this study. To overcome these limitations, it is necessary to elaborate on the meteorological model and update domestic and foreign emissions. We concluded that the method of assessing the policy implementation rate and a method of verifying this method are necessary to improve the quality of the model developed in this study.

04 Social Policy

Analysis and Policy Measures of Seoul's All Day Care

Hyesook Lee · Inchel Sin · Samhyun Yoo · Youngjoo Lee

The aim of the study was to analyze the use of Afterschool Care in Seoul and estimate the demand until 2024 to provide the basis for the All Maeul Care plan. For this purpose, a survey was conducted. The sample of this study consists of 1,250 parents of elementary school students in lower grades (1rd through 3rd grade). The main results are as follows.

First, as of 2019, the rate of public afterschool care for lower school age in Seoul was 20.5%. The rate of public afterschool care was different depending on the type of institution, dual income family and residential environment. Second, in combining the main reasons for using and choosing public afterschool care institutions, there is a complex need for safe caring and learning support. Contrary to past study findings, the quality of care program and convenience of facilities were somewhat higher than accessibility. This result seems to reflect the characteristics of education enthusiasm in Seoul. Prior to estimating the demand for Seoul's All Maeul Care service, we estimated the number of elementary school students in lower grades and five region centers in Seoul for the next five years (from 2020 to 2024). The number of elementary school students in lower grades in Seoul is expected to reach 66,602 in 2020. It will then decrease to 53,147 in 2024. Finally, results of the current supply plans and demand estimates showed that the supply would be less than the demand until 2022. If the supply plan is carried out by 2022, the demand will not be met from 2023.

This study is meaningful in that results of this study could be used as basic data for policy promotion based on empirical evidence by examining the actual

condition and demand for all day care of elementary school students in lower grades. Above all, it is meaningful in that the supply of all day care is insufficient at the present level. The empirical data confirmed that the use status would vary according to the region center, dual income family, household income and the grade of the child.

Although this study has its strengths, it also has some limitations. Since this study conducted a sample survey on elementary school students in lower grades, it was not a complete survey to identify all day care needs of all elementary school students. Although many different variables are considered in this study, there are certain limitations in that parents cannot change their behavior based on only one actual situation and intention to use in the future.

A Study on The Designation Criteria of The Seoul-type Alternative School

Hyesook Lee · Yunjung Cho

Every year about 10,000 youths in Seoul quit their studies and leave their schools. To provide alternate opportunities for these "youths out of school" to learn and/or develop their careers, the Seoul Metropolitan Government(SMG) has been supporting unauthorised alternative schools with teacher salaries, tuition fees, and school meal expense.

In addition, the SMG has announced a plan to designate a 'Seoul-type Alternative School' earlier this year, to protect the right of youths out of school to learn at the level of public education. The purpose of this study is to design the criteria for selecting a Seoul-type Alternative School and the management strategy.

For this purpose firstly, we conducted a survey and focus group interview(FGI) to identify the current status of unauthorised alternative schools in Seoul. Based on the survey results, the policy goal of the Seoul-type Alternative School was set as "Guarantee equal learning rights for youth outside school for high quality education".

To achieve this goal, the following five policy directions were proposed: (1) Expand government support to strengthen the publicity of alternative education; (2) Strengthen the accountability of the Seoul-type Alternative School; (3) enhance the professionalism of teachers and education; (4) strengthen the diversity of education; and (5) secure financial transparency and democratic procedures in management.

The criteria for designation consisted of three mandatory items and two additional items. The mandatory items were 'qualification of teachers', 'education space' and 'curriculum', which are the key elements for educational activities. The additional items were 'transparency in management' and 'independence and democratic procedure in management'.

A minimum standard was set to lower the entry barriers for the existing unauthorised alternative schools. In other words, this will provide minimum qualifications to be equipped as a school, such as the stability of the educational space and guarantee of the quality of education, thus providing more opportunity for youth outside the school to get a chance for higher quality education in the future.

Developing the Seoul Basic Livelihood Security Scheme: Plan to Reduce Welfare Blind Spots

Seung-Yun Kim · Hye-Rim Lee · Young-Joo Lee · Kyoung-Hoon Han

Since 2013, Seoul city has offered the Seoul Basic Livelihood Security (SBLS) Scheme in order to protect marginalized population who left behind by National Basic Livelihood Security (NBLS) Scheme. In this paper, we focus on non-take-up of the SBLS, which has not been widely studied to date.

First, we examine the size and determinants of non-take-up in Seoul by using 13rd Korea Welfare Panel Study. Our finding suggests that nearly 18 million people remain as non take-up of SBLS and 80% of these entitled populations have never been applied for the benefits, 20% of them have failed a means test mostly because of strict family support obligation rule.

Second, we examine entry barriers of the SBLS: income standard, property standard, and family support obligation rule. We suggest various options to alleviate the means test standard and estimate the number of increased beneficiary under the improved eligibility criteria. ‘Abolishing family support obligation model’ was confirmed as the best effective way to reduce welfare blind spots, among them. Our estimation presents that additional 500 thousand of marginalized population can obtain SBLS entitlements under this model.

A Study on the Development of Awareness Indicator and Pilot Survey on Cultural Diversity in Seoul

Seonhae Baik · Yunjung Cho

The protection and promotion of cultural diversity is fundamental to building a sustainable community. In line with this, the Seoul Metropolitan Government (SMG) has established a foundation for policies ensuring more robust cultural diversity through the legislation of the Act on the Protection and Promotion of Cultural Diversity. Designing and implementing programs that promote cultural diversity should be followed by cultural diversity research which is backed by studies on civic awareness. This study was conducted as part of a pilot study to design indices for civic awareness studies.

The Seoul Cultural Diversity Awareness indicator is significant because it defines residents as those who accept minority groups and who are in fact included in the minority groups themselves. This indicator was designed to highlight the importance of cultural expression and that of respecting such expression.

An online study using the indicator as a measure was conducted with 1,000 Seoul residents as respondents. Due to the limited sample size and composition, the cultural expression of cultural minority groups could not be accurately assessed. To mitigate the lack of accuracy, extra in-depth interviews were also conducted with minority group professionals and activists.

This study aims to serve as a foundation for the SMG to introduce more policies to promote cultural diversity. Extending and strengthening this research requires continuous and regular studies highlighting the importance of establishing a Cultural Diversity Committee that will serve as the control tower for implementing such policies.

05 Economy

Research on the Social Ownership Strategies for Economic-purpose Real Estate in Seoul

Eunjoo Oh · Hyun-Chan Ahn · Seunghoon Oh · Myungshik Choi · Hayun Park

Small traders and enterprises including cooperative, social enterprises, and local enterprises have suffered from high-rent, short and unstable rent period, especially in large cities and gentrification regions. In response to these threats, small firms and social economic organizations voluntarily tried to acquire joint ownership over real estate by themselves.

The ownership should be called 'social ownership' in sense that the joint-owner might include individuals, non-profit organizations, and the public who all agree with protections of small enterprises in city.

Recently, the Seoul Metropolitan Government (SMG) has strongly emphasized the importance of community asset and social ownership for inclusive economic growth. This study intensively examines several cases of social ownership movements in Korea by conducting in-depth interviews with CEOs to propose strategies for promoting social ownership for the SMG. Also, this study explores foreign cases in the UK, America, and Canada to get insights into what policies and institutions might help Korean cases.

Finally, this study proposes two-track approaches for the SMG: the SMG as an accelerator to facilitate civic-led social ownership movement and the SMG as another asset owner who should be open to economic actors, interested in social ownership.

Growth Strategies for Seoul Biomedical Industry Based on Locational Patterns and Innovation Network

Eunjoo Oh · Seunghoon Oh · Jaeseong You

The Seoul Metropolitan Government (SMG), along with central and other local governments, has strongly emphasized the role of biomedical industry as a new growth engine. Specifically, the SMG announced the Hongneung cluster policy including the 'Seoul Biohub' plan.

This study proposes strategies for the development of Seoul biomedical industry while understanding the locational characteristics and the innovation network of the industry. According to data supplied by the Korean National Statistical Office, only 5.9 percent of biomedical establishments have undergone relocation between 1994 and 2016. Despite the fact that the Hongneung region has been reputed for a higher number of startups in bio-pharmacy, the Seoul biomedical industry appears to be locked in the existing industrial region because of deep reliance on other biotech firms and innovation partners. However, the biomedical firms rely heavily on their relationship with major hospitals. Preclinical and clinical testing requires the cooperation between a variety of players such as medical universities, CROs, and CMOs. In conclusion, this study has proposed several biomedical strategies for Seoul.

A Study on the Development of Seoul-style Deliberative Democracy Model

Byeongsun Jeong · Wonsill Hwang

In order to establish the civil deliberation model, this study examines four aspects: model specification, construction of deliberate infrastructure, model project, and institutional support system.

First, in order to embody the Seoul-style deliberative democracy model, an operation system was established according to types, procedural principles, and deliberation model. First of all, four types of civic model were derived: social problem solving type, conflict management solution type, public planning type, and special purpose type (specialized type). We have established the universal procedural principles needed to realize public deliberation. Seoul-type civic deliberation considers ① the principle of political equality, ② the principle of openness and inclusiveness, and ③ the principle of deliberation. It is also necessary to carefully consider the main operating factors in applying the deliberation model to the actual deliberation program.

Next, in order to establish a face-to-face and online-based deliberation infrastructure, as a face-to-face-based leading deliberation infrastructure, the Seoul Citizens' Council (tentative name) was established and operated. We will redefine the function and operation system as a deliberation model beyond the current civil petition function, and build a leading platform for citizens at various spatial levels to support the model of citizens from the front and back.

Third, based on the Seoul-based deliberation model and institutional infrastructure proposed above, the following effective model projects will be promoted. Major model projects include ① introduction and operation of the Seoul S-Speak / S-Decide program, ② operation of the project in conjunction with the Citizen's Housing Budget, and ③ cooperation with the community.

Lastly, to establish an institutional support system for vitalizing deliberative democracy, three specific measures: ① the establishment and operation of the Seoul Citizens' Deliberation Committee (tentative name), which leads the Seoul public sphere, ② amendment of related regulations supporting deliberative democracy, ③ installation and operation of educational programs for the reinforcement of civil deliberative capacity were prepared.

Building a Strategic Management of Seoul Compact in the 7th Mayoral Term

Byeongsun Jeong · Eun-Young Han

Social Compact is one main task in the 7th mayoral term as part of the innovative cooperative system. The purpose of this study is to find a rational way to effectively promote the Seoul Compact.

To achieve strategic management of Seoul Compact, this study was conducted in four stages. The first stage was the preliminary stage of Social Compact discussing the conceptual meaning of Social Compact with its background and purpose. In the second stage, the UK Compact was selected as the case of Social Compact in foreign countries. In addition, national Compact and three local Compacts were investigated. Third, this study conducted a survey on subjects directly or indirectly involved in the Seoul Metropolitan Government as a social awareness and policy demand survey for the promotion of Seoul Compact. Fourth, this study suggested policy plans for promoting the Seoul Compact. As a plan for promoting the Seoul Compact, this study proposed three plans: ① establishing a strategic promotion system of the Seoul Compact, ② deriving basic ideas and action tasks of the Seoul Compact, and ③ institutionalizing plans for strengthening the effectiveness of the Seoul Compact. Specific contents of each plan are as follows. The establishment of strategic promotion system is prepared as the organization of participating subjects, the public discussion for concluding the Seoul Compact, and the diversification plan for the spread of the Seoul Compact. In the derivation of basic ideas and action tasks of the Seoul Compact, the configuration system for the preparation of the agreement was established. Items and specific contents in the agreement were derived. Lastly, the institutionalization plan for strengthening effectiveness of the Seoul Compact was composed of implementation and support system. The implementation system consisted of the

following three components: establishment of action plan, monitoring system of the Seoul Compact, and evaluating system of the Seoul Compact. For the support system, legal institutionalization plan and organizations for implementing the Seoul Compact were suggested.

This study is expected to contribute to the establishment of horizontal and cooperative relations between administration and civil society for realizing citizen democracy by supporting the promotion of the Seoul Compact introduced as the main policy of municipal administration.

The Digital Economy of Capital Region and Software Industry in Seoul

Jaeuk Ju · Jongjin Yun

The purpose of this study is to analyze the current state of the digital economy in the capital area and to suggest the development direction of the Seoul software industry. We analyzed the number of businesses, employment, value-added, transfer, industrial structure, and economic ripple effects using micro data of various statistical data such as economic survey, national business survey and regional employment survey and the features are described.

The digital economy is concentrated in the capital area, with software in Seoul and hardware in Gyeonggi. Software concentrated in Seoul is growing and spreading to neighboring Gyeonggi provinces. Recently, startups are actively doing their businesses, while Gyeonggi is forming new clusters with the inflow of mid-sized companies moved from Seoul.

Seoul's software is becoming more diverse, with the proportion of games and IT services increasing as the portion of packages decreases. According to the location quotient analysis, thirteen software clusters have been found in Seoul, with ten regions including Guro, Gangnam and DMC functioning as clusters.

Based on the findings, the following policy is proposed. It is desirable for Seoul to contribute to the spread of the digital economy by utilizing the characteristics of startups. In addition, efforts should be made to foster high-quality human resources to respond to employment demands and to strengthen industrial competitiveness. It is desirable to share the role of Gyeonggi-do with different characteristics from Seoul, and to cooperate with each other. In addition, it is necessary to develop a customized strategy according to the characteristics of the clusters.

A Study on Policies to Promote the IIoT Industry in Seoul

Bong Choi · Yoon-Hyi Jang

The Internet of Things (IoT) is an intensively discussed topic in industry, government and academia. The industrial application of IoT is Industrial Internet of Things (IIoT) also called Industry 4.0, offers a significant innovation potential for entire industries. IIoT is a new industrial ecosystem that combines intelligent and autonomous machines, advanced predictive analytics, and machine-human collaboration to improve productivity, efficiency and reliability. Both IoT and IIoT have technical challenges, but the risks and complexities for autonomous industrial applications are inherently higher.

Accordingly, the Seoul Metropolitan Government (SMG), which recognizes the importance of the IoT, strives to foster the Internet of Things industry. But despite the importance and growth potential of IIoT, interest in IIoT is relatively low.

The purpose of this study is to present policies for promotion that can ensure the substantial leap of Seoul's IIoT industry and market. Considering the results of this study, the SMG should contemplate the following policy directions. First, it is necessary to develop a policy with the commercialization of the actors participating in new IIoT product/service development in mind. Second, consider creating value between and within industries through the IIoT. Third, consider redefining roles and values of process, data etc. Fourth, it is necessary to consider support policies for the entire life cycle of commercialization from the business selection to the final after sales service.

Improving the Labour Environment in Seoul's Small and Medium-sized Enterprises and the Implications of Related Policies

Jinha Kim · Min-young Hwang

In recent years, serious concerns around increased fatalities in industrial accidents have emerged, with these comes the need to improve the labour environment in Seoul with regard to worker's safety.

Small and Medium-sized Enterprises(SMEs) in Seoul make up an important share of industry and employment, unfortunately, the majority of industrial accidents are occurred in SMEs. Most SMEs in Seoul are focused on sales or are restaurant businesses. Therefore, employees in these businesses are vulnerable to mental health risks caused by customer interaction. The city of Seoul contains a large share of wholesale and retail along with lodging and restaurant businesses. The people working in these companies are, therefore, vulnerable to complex physical and mental health risks.

Due to the revision of the Korean Industrial Safety and Health Act, contractors' responsibility for preventing industrial accidents has been strengthened. In addition, the parties that can be potentially held responsible have been expanded. The Seoul Metropolitan Government has established an ordinance to lead changes to the labour environment of affiliated organizations and to conduct inspections.

In order to improve the labour environment of SMEs in Seoul, it is necessary to expand the scope of the ordinance. In addition, companies with excellent industrial accident prevention and occupational safety and health should be selected as an example of good practice. In addition, it is necessary to resolve the blind spot of industrial accident insurance and establish a data collection system.

Policy Evaluation on and Recommendation for Seoul Industrial and Special Development Promotion Districts in Seoul

Eunjoo Oh · Jae-Seob Yang · Deungyong Heo · Jongjin Yun

The policy of Seoul Industrial and Special Development Promotion Districts (hereafter the Districts) is considered the representative policy for the regional industrial cluster in Seoul. In 2007, the Seoul Metropolitan Government (SMG) launched the Districts policy that is made up of a combination of industrial promotion projects and urban planning incentives. This study takes a close look at the six Districts (Jongro Jewelry Districts, Sungsu IT District, Mapo Design-Publishing District, Dongdaemun Oriental Medicine District, Jungnang Fashion-Clothing District, Junggu Printing District) in terms of the policy's progress and its effectiveness.

Despite the ambitious goal of the SMG, the Districts policy has faced severe obstacles. The originally proposed policy means have not actually been implemented due to poor policy coordination and leadership, limited financing sources, poor design for the city tax exemption plan, public low-interest business loans not being taken advantage of, and very few supporting or complimentary programs. Moreover, it is impossible for the urban planning incentives to be effective because of incomplete measures to restitute development gains of business facility owners from the incentives.

This study gives three suggestions to the SMG: institutional reorganization in areas such as city ordinance; an integrative implementation system based on a master plan; including industrial promotion support in order to reinvigorate the community of the target industry.

Establishing a Master Plan for Developing Civil Democracy in the Seoul Metropolitan Government

Byeongsun Jeong · Wonsill Hwang

To establish a master plan for developing civil democracy in the Seoul Metropolitan Government, the concept, nature, composition system and planning conditions of civil democracy were considered in various ways in order to derive a basic concept of the plan. Considering conditions of this plan first established in the 7th year of civil election, the nature, scope and composition system of the basic plan were then established. Finally, planning conditions necessary for establishing the basic plan for civil democracy were investigated and analyzed.

Based on results of analysis, a priority planning task was drawn for related institutional innovation to establish a resource base for democratic correction and a civil society policy ecosystem.

The following five priority tasks were drawn to innovate the system related to civil democracy: ① Reasonable improvement and reorganization of ordinances and related plans related to deliberation, cooperation and autonomy, ② Establishment of a democratic correction system that can lead to participation and deliberation, ③ Search for continuous administrative innovation (institutional innovation) for the advancement of corrective measures, ④ Decentralization including establishing a mid- to long-term institutional foundation for the realization of self-government and resident self-governance, and ⑤ Social awareness of democracy and self-government with and the establishment and diffusion of administrative culture.

To establish the resource base for democratic administration, the following three priority issues were drawn: ① Expansion of various resources necessary for the introduction and operation of the system and establishment of an effective management system, ② Expansion of public resources to promote citizen democracy and establishment of an institutional foundation for rational

management, and ③ Financial independence base for securing sustainability and autonomy of civil society ecosystem arrangements and the like.

The following three priority issues were drawn to build a civil society policy ecosystem: ① Realization of civil democracy, including strengthening the self-reliance foundation for sustainable growth in the wide and basic civil society, ② Establishing a social recognition system to promote public interest activities, and ③ Strengthening capabilities of civil society actors and promoting mutual linkage and cooperation.

In addition, it was necessary to consider the role and operation system of an interim support organization with the re-establishment of the segmented policy promotion system as a current task for each related field.

Scale-up Policy for Seoul

Dalho Cho · In-Hye Yu

Newly established businesses are going through a very bumpy road, and many of them do not survive for quite some time. In Korea, only 8.2% of newly founded business firms survive and last for more than 10 years. Only a few survive and flourish, and hence, create substantial amount of value-added and employment for its own sake and for society.

The Seoul Metropolitan Government (SMG) tries to help establishing new businesses by providing offices with free of charge, consulting and education opportunities. However, what really matters are how to select a few good business firms, how to mentor and educate them properly, how to connect them with other businesses including angel and venture capital, and hence, make them scale up and prosper.

This research provides some case studies of good scale-up policies home and abroad, and suggests ways of scale-up policies for Seoul.

06 City Diplomacy

City Diplomacy Strategies for Exporting Policy Solutions of the Seoul Metropolitan Government

Chang Yi · Meekyong Song

City of Seoul has been getting the spotlight in the international stage as a sustainable smart city. Indeed, Seoul has made a great leap from a devastated city because of the Korean war to a global metropolis in the 21st century. It is the outcome of outstanding policy solutions to solve its urban problems for decades. City governments in developing countries without proper infrastructure have expressed strong interests in learning from Seoul.

In this context, the Seoul Metropolitan Government (SMG) had establisehd the Global Urban Partnership Division in 2014 to export its policy solutions to cities in other countries. The SMG has focused on the Official Development Assistance (ODA). However, the ultimate goal is to generate profits by exporting solutions developed in Seoul. This goal has yet to be reached. The potentials in policy solutions of Seoul have been fully realized.

This study suggests two ways to reach the goal of making profit envisaged in exporting Seoul policy solutions. First, the city of Seoul should strengthen its public diplomacy effort. To export, there should be the need for import. When citizens in other countries have positive views on policy solutions in Seoul, it is then ready for the SMG to export policy solutions to cities around the world. This study evaluates the public diplomacy programs, currently being implemented in Seoul, and proposes strategies to make its effort more effective.

Second, the study reviews how other cities have succeeded in exporting their policy solutions. Cases from Singapore and Netherlands have been examined.

Based on the overseas examples, we propose 1) The SMG should strengthen its relationship with the national government. City diplomacy may be more effective if international network accumulated by the national government is utilized for the benefit of Seoul; 2) The effort to export solutions should start with 'software' transfer to cities in developing countries. Software refers to institutions, regulations, attitudes, and experiences in advanced administilative systems in Seoul. The SMG needs a strategy to link software transfer to 'hardware' sales; 3) The SMG should consider Small and Medium-Sized Enterprises (SME) that have collaborated with the SMG as the primary agents for generating profit by exporting urban solutions.

Towards that end, the role of the Seoul Urban Solution Agency (SUSA) must be changed. Now it is one of the principal agents engaged in exporting Seoul solutions and making profit. In the future, the SUSA should focus on promoting the private sector to facilitate successful generation of profits by the SMES in an effort to export policy solutions from Seoul. In other words, the SUSA should act as a catalyst for exporting solutions and making profits, and not as a main actor.

The Seoul Metropolitan City's Humanitarian Action Plan for North Korea

In-Chul Mun

Human rights are the most basic and universal rights of mankind. The international community justifies humanitarian intervention in terrible situations in certain countries for the purpose of protecting citizen's human rights. The legitimacy of such humanitarian intervention is secured from the realization that the welfare of mankind as a whole based must be protected through these human rights protection principles. Therefore, Seoul Metropolitan City's humanitarian activities for North Korea are related to the realization of welfare that all human beings deserve, including North and South Koreans.

The humanitarian activities of Seoul come from a love for humanity that goes beyond national, ethnic, racial, political, economic, social and cultural boundaries. Moreover, we are one Korean people, as such we have to coexist for peace and unification with North Korea. 'Peace and unification' is not just an issue for the central government. It is a matter that all actors of the nation, including local governments and citizens throughout the peninsula, must work together.

It is not in harmony with the spirit of humanitarianism to support things which were left out of our abundance. Moreover, South Korea has about 40 times higher economic power than North Korea as well as a very stable welfare system. On the other hand, North Koreans suffer from hunger and various diseases due to economic difficulties and food shortages. Seoul's humanitarian activities for North Korea are not about the strong showing favor to the weak. Humanitarian activities in Seoul are actions to help us live together maintaining and protecting human dignity, which is a universal value we hold dear.

Living together on the Korean peninsula means securing peace and unification. The international community's sanctions on North Korea due to it's attempted

nuclear proliferation limit most inter-Korean cooperation projects. Accordingly, despite the terrible humanitarian situation in North Korea, domestic and foreign humanitarian organizations have had a hard time supporting North Korea. Humanitarian action for North Korea is not a subject of the sanctions. The UN points out the negative impact of strong sanctions on humanitarian activities for North Korea. The sanctions against North Korea are aimed at resolving the North Korean nuclear issue, are not obstacles to Seoul's humanitarian activities. Therefore, as a capital city, Seoul should actively engage in humanitarian activities to North Korea to serve as a model for other local governments.

Seoul's humanitarian activities for North Korea will contribute significantly to promoting peace on the Korean peninsula. The humanitarian activities of Seoul can be a starting point for improving inter-Korean relations and help achieve sustainability. Seoul's humanitarian activities for North Korea will also contribute mutual economic benefits in that they are carried out in spirit of cooperation rather than unilateral support. Seoul's humanitarian activities for North Korea will also contribute to the practice and spread of the norms of the international community, including the Sustainable Development Goals(SDGs). In addition, Seoul's humanitarian activities will also serve as the basis for non-traditional security cooperation between the two Koreas, including tacking issues such as poverty, infectious diseases, environment and human rights. Stable inter-Korean relations are to be based on mutual trust. In this regard, the humanitarian activities of Seoul will help North Koreans to increase their awareness of and positive feelings about South Korea and it will in turn lead to the promotion of a beneficial mutual relationship between the two Koreas. Accordingly, Seoul's or South Koreans' understanding of North Korea will be also enhanced. The humanitarian activities of Seoul also will strengthen Seoul's role as local government in decentralized North Korea policy. As the capital of South Korea, Seoul must lead such a decentralized North Korea policy.

Given the poor humanitarian situation in North Korea and the reciprocity between the two Koreas, Seoul can explore various ways to give assistance such as

support for energy bars to help food diversity, support for goods to protect against the cold and health sanitation supplies and establishment of family reunion video call systems and disaster prevention systems. In particular, Seoul can explore ways to use the city's social economy for humanitarian activities in North Korea. This will help Seoul's vulnerable groups and can serve as the basis for building humanitarian action platform in North Korea.

Mechanism and Future Directions of City Diplomacy

Min-gyu Lee

City diplomacy is a direct result of rapid urbanization and 'new diplomacy' in the era of globalization. It has emerged as actors in international relations have diversified and fragmented while intermesticization, which blurs boundaries between domestic and international issues, occurred. In particular, with rapid post-war urbanization, units known as "cities" have become more common and have been blamed for a wide range of problems, referred to as "the paradox of globalization". With this problem, there are strong demands for these citities to undertake a practical role on the international stage. This can be seen as an important component behind city diplomacy. Contemplation into new ways to engage in such diplomacy should not be overlooked. If diplomacy based on "clubs" in the past has not transformed into a network-based activity, a new form represented by city diplomacy would not have emerged.

The core actor in this endeavor is regional government. Specifically, city diplomacy is a diplomatic activity that basically aims to tackle common issues, share policy and experience, and enhance international competitiveness based on regional officials' effort to cooperate and forge ties with actors ranging from sub-national level to transnational level.

To achieve basic objectives of sectoral goals for 'economic and food security', 'health security', 'environmental security', 'personal security', 'community security' and 'political security' of individual residents, the regional government is currently pursuing city diplomacy in six domains: peace, environment, economy & food, healthcare, human rights, and culture. In other words, its ultimate aim is to ensure security of residents by putting both conventional and non-conventional security issues on the agenda. This also serves as a basic mechanism of city diplomacy. In the process of doing so, there is a demand for strategic and organic

execution of specific diplomacy which defines fields, actors, objectives and instrumental characteristics of diplomacy in line with categories of new diplomacy. On top of this, there is an increasing need to build relations with other actors and recognize and appropriate roles. Despite years of existence, city diplomacy has not been analyzed adequately. It is still used interchangeably with concepts such as paradiplomacy, sub-state diplomacy, and regional diplomacy. However, diplomatic activity led by regional governments is on the rise. Studies on city diplomacy have also increased over the last decade.

For a regional government to be a main actor in international relations and for city diplomacy to be widespread, it will need to advance in the following four directions. First, issues should be resolved with a focus on multilateral diplomacy. Second, on top of permanent diplomacy, measures to manage short-term crises should be designed. In particular, regional governments should be given greater roles in responding to conflicts. Third, a robust multi-layered governance system that ensures increased efficiency in multilateral diplomacy and clear roles should be set up. Lastly, systemization of Mayor diplomacy should improve efficiency in internal decision-making while increasing roles within multi-layered governance.

Developmental Status of the Seoul-Beijing Joint Committee and Initiatives for Greater Institutionalization

Min-gyu Lee · Eun-hyun Park

The Joint Committee of Exchanges and Cooperation between Seoul and Beijing (hereunder the "Seoul-Beijing Joint Committee") was founded in 2013 to mark the 20th anniversary of the establishment of a sister city relationship between the two cities. The Committee aimed at establishing itself as platform for sustainable exchanges and cooperation between the two cities based on several factors. Based on experience, a shift away from one-off exchange towards greater and sustainable exchange and cooperation between the capital cities of South Korea and China was envisioned, prompted by their increasing role in non-traditional and transnational security issues as well as stronger economy ties.

The Seoul-Beijing Joint Committee, which will hold its fourth conference in May 2021, has been carrying out various projects for exchange and cooperation in four major areas including economy, culture, education and environment with a view to: i) establishing a sustainable exchange platform, ii) planning and managing agenda for the pursuit of common interests, and iii) building an expertise-based human resource network and system.

"Sustainability", the focal point of the Seoul-Beijing Joint Committee, is directly related to and proportional to the degree of institutionalization of the committee. This report reviews the degree of institutionalization of the committee from three aspects: "in-group identity", "generalized principles of conduct", and "indivisibility and diffuse reciprocity".

First, "in-group identity" is assessed by gradual development within the committee. Faced with adverse external circumstances, such as THAAD deployment and the Covid-19 pandemic, the two cities postponed a scheduled conference instead of cancelling it altogether, thereby continuing to host conferences. Since

its founding in 2013, the committee has met regularly every two to three years. The organization has expanded from three to four teams (Economy, Culture, Education, and Environment). Its regular conference was upgraded to mayoral level from the second meeting, resulting in increased numbers of official participants and higher-level officials in the secretariat and the respective teams.

The committee showed improvements in "generalized principles of conduct", which are being followed by signing of MOUs and the promotion and implementation of exchange and cooperation. A total of seven MOUs have been concluded by the third conference held in 2018. Since the first conference, the promotion and implementation rates have climbed by 21.9% and 5.4%, respectively, in the second conference, indicating a higher tendency for adherence to consensus between the two sides.

"Indivisibility and diffuse reciprocity" appears to have emerged during the promotion and implementation of "mutual" exchanges and plans for cooperation as well as their retention in the pursuit of common interests. The rate of promoting "mutual" plans rose to 78.0% in the second conference compared with 59.5% in the first conference. The rate of plan retention also increased to 62.1% in the third conference from 39.2% in the second conference, showing signs of a positive change.

Overall, the Seoul-Beijing Joint Committee appears to have evolved into a solid model of city diplomacy between the two cities with a focus on common interests. The three elements of "in-group identity", "generalized principles of conduct", and "indivisibility and diffuse reciprocity" are creating a virtuous cycle, reinforcing each other. Despite issues such as lack of in-group identity for the Education Team due to the absence of a mutual regulation mechanism and a temporary decline in cultural and economic exchanges and cooperation caused by THAAD deployment, the committee has achieved a certain level of "institutionalization".

The development of the committee into a sustainable model of city diplomacy requires formulation of clear initiatives to enhance the level of institutionalization. Such initiatives can include: i) developing a network of cities in Northeast Asia to

cope with common issues in the longer term, ii) enhancing health security of the citizens of the two cities by establishing a Health and Medical Team in the near term, iii) signing MOUs between different teams for conference and systematic assessment of exchanges and cooperation, iv) developing initiatives for “mutual” exchange and cooperation, and v) managing plans for near- and long-term exchange and cooperation separately.

Characteristics of Chinese Economic Retaliation against Developed European Countries and Integrated Crisis Management Strategies

Min-gyu Lee

In the past, China was engaged in economic retaliation against France and Norway, two leading countries in the Europe. This study provides insight into the dynamics of this economic retaliation and the crisis management strategies of France and Norway, and analyses how South Korea can learn from the conflict resolution efforts of these two nations in developing political strategies to manage potential conflicts with China, as well as the role of local government in the process. The conclusions of the study are as follows:

The economic retaliatory measures taken by China show that the country a) exerts political or diplomatic pressure before economic retaliation against the target country, b) boycotts goods and services more often than embargoes or financial sanctions to minimize the adverse impact on its own country, c) minimizes the direct impact on the targeted country's economy by restricting the scope of retaliation as its main purpose is to inflict political damage, d) allows protests in China, as long as they are under the Party's control, and e) continues to adopt retaliatory measures until political and diplomatic goals are accomplished.

When China launched boycott campaigns against Carrefour, the French retailer, the French government's first move was to immediately dispatch high-level officials to China, as part of its efforts to resolve conflict with Beijing. It is particularly notable that this was quickly followed by a visit from a former Prime Minister of France who is a long-time friend of China. These actions show that French authorities well understand "guanxi", the dynamics of social network deeply rooted in Chinese culture. The French approach was centered around ways to protect "mianzi", or the social (or in this case, political and diplomatic) status of

the two countries.

On the other hand, the Norwegian government stated that the Nobel Committee's decision over the 2010 Nobel Peace Prize (at the heart of China's dispute with Norway) was non-governmental as the Committee is independent of the government, while taking a tit-for-tat approach against the political and diplomatic pressures from China. Oslo also took China's restrictions on imports of Norwegian seafood to the WTO, making the dispute an international matter. The "carrot" in its strategy was to open windows of opportunity for a broader cultural and human exchange, with coercive diplomatic measures being the "stick".

The strategy of France and Norway has implications for the Korean government's crisis management capabilities regarding South Korea-China relations. First, the initial political and diplomatic pressures from China serve as warning signs. Second, Chinese economic retaliation is all about political taming of the targeted country, not damaging its economy. Third, China targets certain industries to maximize the political impact of retaliation. Fourth, China is open to negotiation when the country is hit by retaliation to begin dialogue. Lastly, Negotiation is effective only when backed by both "carrot" and "stick".

The conclusions of our analysis leave five key lessons for South Korea with regard to crisis management strategies. Normal South Korea-China relations require the Korean government to a) identify issues on which the two countries may not see eye-to-eye and create conflict resolution scenarios for each topic, b) build a multi-level governance system to expand the role of each actor, c) prepare key industries for any potential damage and design support systems for those industries, d) diversify communication channels and send special envoys that best understand China and its culture, and e) identify the strategic limits for each issue and prepare a "stick" for negotiations.

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