ISSUE PAPER

Government Innovation Strategies in the Post COVID-19 Era : Implications based on the analyses of Korean COVID-response cases

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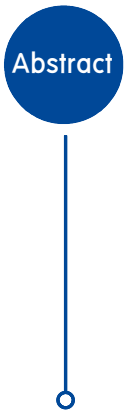


South Korean government's innovation efforts have been continuously made, although the goals and strategies changed with the administrative regime changes and in which is said to result in "innovation fatigue" for the Korean public officials. However, the Korean government innovation strategies played crucial roles in dealing with the COVID-19 crisis. This paper analyzes how government innovation strategies worked by studying four successful cases of ① promoting open data and collaboration: creation of Corona Map, ② changes in working pattern: video conferencing and telecommuting, ③ bottom-up innovation and dissemination: implementation of drive-through screening clinics, and ④ information system linkages: creation of duplicate mask purchase verification system (DMPVS).

Based on analyses of the process, outcomes and implications of the four cases, this paper presents five lessons and six strategies that are noteworthy for future government innovation.

01

Government Innovation: crucial roles in a crisis

Government Innovation: a cause of frustration for public officials

○ Government innovation should be a regular part of government function so that it is more able to respond to environments with high uncertainty and rapid change.

- In disaster situations for which no past learning experience has been accumulated, demands for change and innovative activities are especially high because of the inability to solve problems in a conventional manner.
- Furthermore, disaster situations that require urgent decision-making to minimize damage can trigger creative ideas never tried or even considered before, and a growing need to attempt different strategies to solve problems can create a positive environment for innovative activities.
- In order to effectively respond to such an environment, day-to-day innovation needs to be internalized to enable innovative activities that bring about the correct solutions.

○ However, experts have been pointing out that the goals and strategies of government innovation changed with the administration regime changes, causing confusion and frustration for public officials.

- The results of surveys conducted by the Ministry of the Interior and Safety on government innovation awareness and training satisfaction showed that many public officials find it difficult to innovate within the government: "31% [of respondents] were unable to explain government innovation," and "67% believed that government innovation cannot be applied because of the rigid organizational system."[1]
  - For example, the strong drive to systemize innovation within the government made by the Roh Moo-Hyun regime (2002-2007) led to much negative perception on such innovation among government officials who were expected to put it into practice. Such a phenomenon had led to "innovation fatigue"[2] among government officials.

[1] Newsis (2020.1.28), "Government Innovation that Government Officials Are Not Even Familiar with...'It's hard to apply on actual work.'"
[2] Lee, Heejae (2004), A Study on the Innovation Fatigue of Central Government Officials. Master's thesis at Seoul National University's Graduate School of Public Administration.

- However, the Korean government has tried to design, implement and internalize government innovation by introducing various measures such as the establishment of a permanent innovation department, creation of a new position in the organization, and introduction of innovation performance management system.

Government innovation : a crucial method for dealing with the COVID-19 crisis

○ The COVID-19 crisis, caused by an emerging infectious disease, requires governments to quickly adopt creative means and to cooperate with various actors for the sake of people's lives.

- As innovative responses, the Korean government has made relevant data available, overcome physical distance by experimenting with virtual working, actively utilized the creative knowledge of actors in the field, and delegated its authority.
- The Korean government's drive to innovate, such as making data accessible to the public and promoting public–private collaborations, which had been made before the outbreak of the pandemic, played a crucial role in the face of a real national crisis.

○ This paper analyzes four innovative responses to COVID-19 and presents implications based on activities, which should be continued and improved for future government innovation.

- The four cases are as follows: 1) promoting open data and public–private collaborations: creation of Corona Map, 2) changes in working pattern: video conferencing and telecommuting, 3) bottom-up innovation process : implementation of drive through screening clinics, and 4) systems linkages : solving face mask shortages through a duplicate mask purchase verification system (DMPVS).

02

Case Study: Combining speed, cooperation, creativity and experimentation

1. Speed of light: Corona Map launched one day after data became accessible

■ Implementation process

○ Accessibility of public data after the COVID-19 outbreak

- The Korea Centers for Disease Control and Prevention (KCDC) released data on COVID-19 (e.g., travel logs, number of confirmed cases, quarantine facilities of confirmed cases, and number of cases with symptoms) to the public on January 20, 2020, immediately after the first COVID-19 case was confirmed in the country.[3]
  - This COVID-19 data were provided as a file and open API through the KCDC's public data portal[4] and its own website.[5]

○ Introduction of a Corona Map the day after opening public data

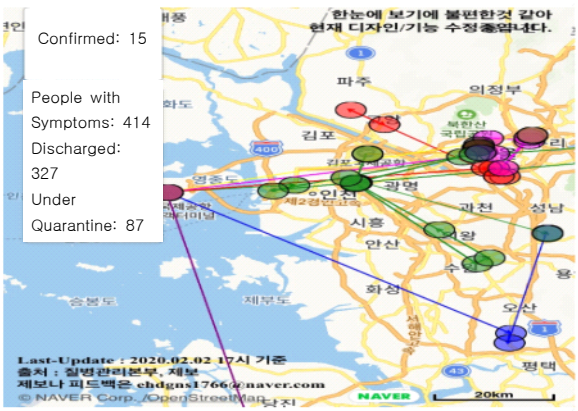
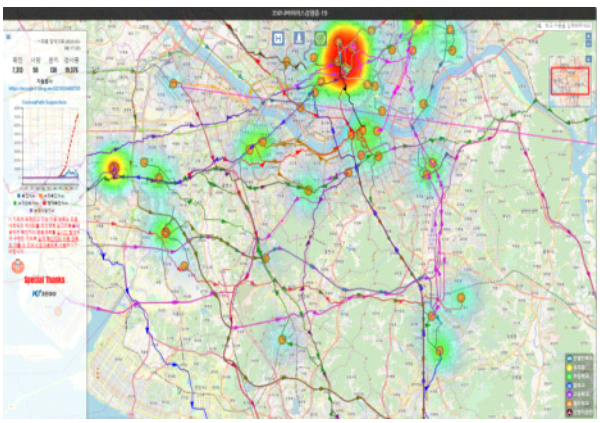
- On January 30, 2020, a college student created a Corona Map in a single day using the aforementioned COVID-19 data and released it free of charge.[6]
  - Corona Map users could check confirmed patients' travel history, which was updated in real time using the KCDC-provided data.
  - On January 31, 2020, the day after the map was made available, it recorded 2.4 million cumulative views, and as of February 13, 2020, it recorded an average of 1 million visitors per day and 13 million cumulative views.[7]

[3] Electronic Times (2020.4.19), "[Post Corona] Corona 19 prevention 'K-Standard' is created using ICT."
[4] Public data portal (https://www.data.go.kr/).
[5] Coronavirus infection-19 (COVID-19) (https://ncov.mohw.go.kr/).
[6] Kyunghyang Shinmun (2020.2.2), "The lack of information, the anxiety of fake news...A college student who made the 'Corona map.'"
[7] Asia Economy (2020.2.13), "'Open data to prevent Corona 19'...Startup meeting (comprehensive)."

○ Introduction of customized data and services related to COVID-19 using public data

– Since the introduction of the Corona Map, private sector developers and companies have actively produced data and services to cope with COVID-19 as well as to predict other infectious diseases in the future.[8]

- Some developers and companies have downloaded public data not only from the KCDC but also from the National Geographic Information Institute and the Korea Local Information Research & Development Institute to produce advanced, precise and comprehensive COVID-19 maps.
- Such a comprehensive COVID-19 map provided customized services to meet different users' needs (e.g., checking patients' travel logs, information of facilities where confirmed cases are located, and searching for test and treatment hospitals).
- Some developers and companies have used artificial intelligence (AI) and mechanical learning to develop data collections concerning the travel history of confirmed patients, which they have offered as open sources or have developed visualization services to create COVID-19 situations and models to predict not only the transmission of the virus but also other infectious diseases.

Corona Map (As of February 2, 2020)	Corona Comprehensive Map (As of March 9, 2020)
	
Source: http://coronamap.site/	Source: http://coronapath.info/

<Figure 1> The Evolution of COVID-19 situation maps

[8] Electronic Times (2020.3.24), "'From public to private'...Datasets shined by the Corona 19 crisis."

Outcomes

○ Building social consensus on the importance of opening public data

- Although the open data initiatives have been promoted continuously as part of the Government's innovation strategies, they did not emerge as an important agenda at the national or societal levels before the COVID-19 outbreak.
- The Corona Map confirms the potential for creative and innovative public service development through open data access at both national and societal levels.

○ Prevention of civil unrest and social confusion caused by fake news and false information

- Fake news and false information were rampant in the early stages of the COVID-19 outbreak, raising concerns about civil unrest and social confusion.
- The development and utilization of maps on COVID-19 allowed citizens to find accurate and timely information, and dispelled civil unrest and social confusion.

○ Creation of a virtuous cycle for public–private collaborations

- The development and utilization of maps on COVID-19 confirm the importance of providing access to data so that creative and innovative public services can be developed by the public and private sectors, which lead to the creation of public value.
- A foundation has been laid for the private sector to demand additional data access for public service development, and the public sector can reinforce the private sector's motivations through such efforts.

Implications

○ Success factors: rapid public–private collaboration based on accessibility and experimentation

- **(Accessibility)** The public sector (KCDC) improved the private sector's access to public data by making COVID-19 data accessible as part of its efforts to open up public data.
- **(Experimentation)** Making public data accessible provides an opportunity for experimentation to develop services that provide accurate and timely information to citizens in times of crisis.
- **(Speed)** In the course of its experimentation, the private sector quickly developed

tailored services, which were rapidly provided and utilized.

- **(Public–private collaboration)** The development and use of COVID-19 maps suggest the importance of rapid service provision based on improved access to public data and the spread of experimentation by private actors in crisis.

○ Limiting factors: non-guaranteed service quality and lack of a support system for public–private collaboration

- **(Service quality)** Measures to ensure the quality of service that are developed quickly through open data access and experimentation are needed.[9]
  - Several citizens, developers and private companies that developed different COVID-19-related maps stopped the services because of a lack of manpower, technology and financing, and some services even malfunctioned.
- **(Support system)** Systematic support and financial incentives at the government level are required to promote experimental activities and fast service development in crisis.
  - For instance, the college student who developed the Corona Map provided it for free, despite having spent his own time and money to manage the server, and the server went down from user congestion.

2. Transcending physical space: telecommuting and video conferencing

■ Implementation process

○ Innovation initiatives to promote social distancing

- To promote social distancing, the Korean government encouraged non-face-to-face (untact) forms of work and asked the public to cooperate.
  - Active adoption of “remote work” including “working from home” and “smart work” took place.
  - The government and public institutions with very traditional style of working required the public servants and employees to work from home on a rotational basis.
  - Avoidance of face-to-face meetings was advised not only within departments but

[9] Women’s Chosun (2020.4.6), “College students who made ‘Corona Alert’ and ‘Mask Alert.’”

also among agencies and institutions by conducting video conferences.

○ Preparedness before COVID-19

- The advancement of e-government systems and expansion of teleworking infrastructure, which had been in place before the COVID-19 outbreak, enabled teleworking and online cooperation during the crisis.
  - Adoption of the Government Virtual Private Network (GVPN) allowed extending a private network across a public one, and enabled users to send and receive data across shared networks as if their computing devices were directly connected to the private network.

[Table 1] History of On-nara System Development and Distribution

Year	Content
2005	Development of the government project management system "On-nara Business Process System"
2006	Development of government policy research and management system "PRISM" (Policy Research Information Service & Management) and the "On-nara Policy Research"
2008	Development of government integrated knowledge management system GKMC ("On-nara Knowledge")
2014	Development of government integrated communication system Nara-e-eum ("On-nara e-eum")
2015	Redevelopment of the On-nara system and GKMC to adapt to cloud storage techniques
2016	Start of integrated On-nara Service/ Some agencies start using On-nara Document 2.0

Source: Based on Seo (2017: 60-63)

○ Separation of physical space triggered by COVID-19: telecommuting and video conferencing

- [Working from home] The Ministry of Personnel Management delivered COVID-19-related service management guidelines over seven times since the infectious disease crisis alert was raised to the "serious" level on March 10, 2020.
  - (March 12) The Ministry of Personnel Management made it mandatory for public officials to work from home on a rotational basis (55 central administrative agencies).[10]
  - (March 13) Government ministries started working from home in shifts.[11]
  - (March 22) Local government officials began working from home in shifts.[12]

10 Yonhap News Agency (2020.3.12), "The government mandates 'public officials' shift telecommuting'...Implementation of 55 central administrative agencies (comprehensive)."
11 Byline Network (2020.3.13), "Government departments, shift telecommuting...Ministry of the Interior and Safety, utilizing GVPN and G-drive."
12 Maeil Business (2020.3.22), "Mandatory 'shift telecommuting' by local government officials and public institutions."

Outcomes

○ Improvement in experience and understanding of remote work in the public sector

- The use of teleworking infrastructure and online collaboration tools increased, which were previously developed but underutilized, as part of a change in work environment.
  - The number of GVPN subscribers increased from 19,425 at the end of December 2019 to 81,799 as of March 26, 2020. With the subscriber increase the number of daily users also increased to about 25,000.[13]
  - Government officials expected to embrace changes in the work environment based on their user experience.

○ Opportunity to redesign work platform

- The work platforms were re-designed to promote virtual working based on the trend of untact.[14]
  - Simple and repetitive tasks will be automatized by introducing AI-based robot process automation (RPA).
  - A system that allows users to work with the administrative system at any time on mobile devices or remotely was adopted (Smart Integrated Administrative Work Environment and Security Enhancement ISP Project).
- Such utilization of new work platform will expedite changes in the working patterns of public officials led by digital transformation.

Implications

○ Success factors: institutional and infrastructure maintenance for active utilization of established infrastructure

- **(System flexibility)** The governments' response to unprecedented crisis drove changes in working pattern.
  - The Ministry of Personnel Management's decision of mandating shift telecommuting and flexible work for the first time in history has significantly lowered the entry barrier to the public sectors' adoption of telecommuting.
- **(Infrastructure adjustment)** Video conference equipment, systems and telecommuting

[13] National Information Resources Service (http://www.nirs.go.kr/newsletter/2020-03/sub06.html).
[14] Digital Times (2020.4.16), "Administrative work by public officials, easy with smartphones."

infrastructure were quickly maintained.

- The rapid increase in the number of GVPN users and video conferencing has led to rapid maintenance of video conferencing equipment not only by government agencies but also by public sector organizations working with the governments.

○ Limiting factors: Poor business efficiency and system maladjustment

- **(Work efficiency)** There are users' psychological rejection and organizations' negative perception of working from home.
  - Those who are not familiar with online infrastructure concerned about reduced work efficiency and online tool adaptation issues.
- **(System maladaption)** Employees who are not familiar with online tools needed to learn and adapt to use new tools.
  - Video conferencing was sometimes interrupted in the early stages of COVID-19 due to lack of training on the usage of equipment. Manuals for working from home and video conferencing are required and with regard to change in work format employees should be trained continuously.
- **(Emotional connection)** Compared to offline communication in the working environment, online communication is insufficient for creating emotional connections, such as empathy and understanding. Therefore, it is necessary to find a way to supplement the emotional connection.
- **(Guidelines)** Since working environments are different for each workplace, telecommuting etiquette and guidelines for online meetings (e.g., camera, microphone, speaker instructions) are required that take into account distinct contexts.

3. Thinking outside the box: adoption of drive-through screening clinics

■ Implementation process

○ Evolution of drive-through screening clinics

- South Korea chose to operate screening clinics since the beginning of the COVID-19 crisis to avoid pandemic.
  - However, methods such as building clinics with negative pressure rooms, disinfecting

clinics, and replacing medical staff's protective clothing were incredibly costly and slowed the screening process.

- The screening clinics evolved from "separated fixed space" to "mobile separated space."
  - Thanks to the unconventional way of thinking, problems were solved by shifting "fixed spaces" in hospitals and health centers, which caused problems for operating screening centers, to moving vehicles that were already "separated spaces."

○ Unrestricted spread of field expert knowledge and rapid decision-making about standardization

- The government quickly accepted expert views[15] during the widespread transmission phase of COVID-19 and rapidly made decisions.
- The drive-through screening clinic idea was first introduced by a medical expert and expanded from private clinics and hospitals → local governments → central government.
  - [Private hospital] Chilgok Kyungpook National University Hospital (February 23) and Daegu Yeungnam University Medical center (February 26) initiated the operation of drive-through screening clinics.
  - [Local government] Goyang City, Sejong City (February 26), and Incheon Metropolitan City (February 27) adopted the drive-through screening clinics in respective order.
  - [Central government] Central Disaster and Safety Countermeasures Headquarters prepared a standard operation model for automobile screening clinics and distributed it nationwide.

○ Securing the infrastructure such as hospitals, equipment and screening centers with the capability to rapidly handle a large number of sample collection and tests

- After the Middle East Respiratory Syndrome (MERS) outbreak in 2015, the emergency response system was restructured to improve and strengthen the testing network between public and private hospitals and related institutions. The public-private network of emergency response system enhanced the country's diagnostic testing capabilities in the time of crises. Therefore, learning from the past

[15] JoongAng Ilbo (2020.3.16), "'Globally praised drive through'...idea of no.1 doctor Kim Jin-Yong."

experience, Korea was able to quickly respond to the COVID-19 pandemic by following the systematic guidelines for public health emergency.[16]

- Besides the rapid approval of COVID-19 diagnostic reagents by the KCDC, the expansion of COVID-19 testing centers provided a basis for rapid sample collection and testing.
  - The number of testing locations increased rapidly from 31 locations nationwide on February 20 (4 Institutes of Health and Environment and 27 private clinical laboratories and hospitals) to 95 as of March 9 (14 Institutes of Health and Environment and 81 private clinical laboratories and hospitals).

Outcomes

○ Reduction of visitor mobility to minimize medical staff's exposure to infection and prevent transmission of the virus

- Safe and rapid testing was performed by reducing the risk of cross-contamination: minimizing contact between patients with respiratory diseases and medical staff, and limiting the examination time to maximum 10 minutes.
- Minimized the exposure of the virus to the public: visitors commuted in their own vehicles instead of using public transportation, which reduced their contact with the public.

○ International expansion of K-quarantine model

- More countries have introduced the Korean drive-through clinic model, including the United Kingdom, the United States, Australia and Germany.[17]
  - A number of actual cases that apply such ideas enable the spread of Korean models with operational expertise and data accumulation.

○ Increase in the adoption of similar innovative ideas

- Incheon Airport adopted similar model of Open Walk-Through clinic.[18]
- To save the local economy from the impact of the COVID-19 crisis, the local market expanded a "drive-through farmers' market" for selling agricultural and seafood products.

16 Maeil Business (2020.3.20), "Korea strengthens 'diagnosis network' after MERS..." Exercise in Corona 19.
17 Dong-A Ilbo (2020.3.15), "Trump admitted belatedly...Corona new Hallyu 'drive through screening clinic.'"
18 Dong-A Science (2020.4.20), "Walk through clinic, 'basics' of disinfection and ventilation are forgotten."

Implications

○ Success factors: readiness for flexible innovation and decision-making

- **(Innovation readiness)** The medical system for infectious diseases management was improved based on lessons learned from the MERS experience.
  - Through the MERS experience, “innovation readiness based on lessons from past experiences” was achieved, such as diagnostic testing capabilities for conducting a large number of tests.
- **(Creativity)** The government was willing to rapidly accept the field expertise.
  - Active acceptance of expert ideas, and quick decision-making and implementation enabled rapid distribution of the standard operating model by the Central Disaster and Safety Countermeasures Headquarters.
- **(Quick decision-making)** The government made quick and accurate decision on the standardization of drive-through screening clinics.
  - Medical experts including the head of KCDC, Jung Eun-Kyung, effectively communicated with the health care professionals in the private sectors and were open to embrace new ideas.

○ Limiting factors: possibility of fundamental obstacles in using and installing infrastructure

- **(Range of users)** There are limitations in the scope of drive-through clinic users.
  - Since only those with automobiles can utilize the drive-through screening clinics, the Government needs to find alternative measures to ensure safe testing for disadvantaged groups.
- **(Installation conditions)** In order to install drive-through screening clinics the spatial installation conditions must be met.
  - A drive-through screening center must be set up in a place which allows efficient and easy vehicle traffic flow. It should not cause traffic jams, and should be located away from residential areas with space for medical waste storage.[19]
  - Local governments need to make decisions considering these spatial conditions and safety of residents in the installed area.

[19] Joong-Do Ilbo (2020.3.3), “Drive-through screening clinic has a good purpose....”

4. System linkage: overcoming mask crisis with duplicate mask purchase verification system (DMPVS)

■ Implementation process

○ Failure in initial response to mask shortage[20]

- Early in the COVID-19 outbreak, citizens had difficulty purchasing masks due to high demand and low supply.
  - There were frequent cases of mask hoarding and sending to family and friends in overseas; citizens had to wait in long lines to purchase masks, and some were unable to purchase due to out of stock.
- The Korean government announces a plan to supply masks through the public distribution network as a countermeasure against the mask crisis, but failed to officially announce the time and volume of the mask supply.
  - The President rebuked the Cheongwadae (Blue house) staff over the Government's failure to respond to the mask shortage, and the Prime Minister issued a public apology.

○ Creation of duplicate mask purchasing system, idea driven by a pharmacist[21]

- A pharmacist proposed a measure to prevent mask hoarding in connection with the Drug Safety Use Service (DUR) through a national petition to the Cheongwadae.
  - The DUR prevents duplicate filling of a medication prescription if someone was prescribed the same medication at another pharmacy.
  - The pharmacist suggested that registering the number of public masks for each social registration number in the DUR would limit the number of purchases per person because it would provide the pharmacists real-time information on public mask purchase history of every citizen.
  - However, some argued that this would be ineffective against mask hoarding owing to the absence of the DUR's legal conditions for masks, which are non-pharmaceutical products, and limitations in the scope of information provided.
- A person in charge of the safe use of medication at the Health Insurance Review and Assessment Service proposed a supplement measure to prevent mask hoarding using

[20] Yonhap News Agency (2020.3.3), "President Moon bowed to the 'mask crisis'...The Minister is on the scene."
[21] JoongAng Ilbo (2020.3.3), "Mask strategies of pharmacists in North Gyeongsang province...Hong Nam-ki was moved in a day."

the nursing home business portal.[22]

- The nursing home business portal is used by pharmacies and other medical institutions to charge for items covered by national health insurance; thus, by using the portal, the mask purchase verification method could be immediately put into practice in pharmacies.
- The Health Insurance Review and Assessment Service added a summary of mask sales to the nursing home business portal, allowing pharmacists to enter mask purchase counts per customer and the available stock at a pharmacy.

○ Building the DMPVS through system linkage[23]

- The Government established a separate DMPVS in the Health Insurance Review and Assessment Service's nursing home business portal to prevent duplicate purchases while introducing the "five-day rotation system for mask distribution;" a policy that allows people to purchase masks on designated days based on their birth years.
  - As all pharmacists are familiar with the use of nursing home business portal, it was easy for them to use the newly adopted DMPVS.
- Establishment of a pan-governmental administrative information system to prevent the hoarding of masks by linking the mask sales system of public mask vendors with the DMPVS.
  - The mask sales systems for the post office and National Agricultural Cooperative Federation, the designated public mask vendors, were linked to the DMPVS in the nursing home business portal.
- A comprehensive system to prevent duplicate purchasing and hoarding of masks was completed by linking the DMPVS with all pharmacies and distributors.

Outcomes

○ Management of mask shortage through system building and linkage

- The main cause of the mask crisis was high demand and low supply, and the mask distribution emerged as a major issue for coping with COVID-19.
- The DMPVS worked as an effective policy measure to reduce mask hoarding and balance the supply-and-demand by setting up the "five-day rotation for mask distribution."

[22] Newspim (2020.3.11), "[Fact Check] Why did they choose 'Healing System Portal' instead of mask measure 'DUR'?"
[23] News1 (2020.3.13), "From today on, the post office joins in five-day system...No duplicates with pharmacies."

○ Elimination of anxiety and social confusion caused by uncertainty in mask purchasing

- The mask shortage crisis was recognized as a potential contributor to individuals' psychological instability and social confusion regarding health and safety at a time when the number of confirmed COVID-19 cases in Korea was rapidly increasing.
- The DMPVS dramatically reduced the uncertainty of mask purchasing. It contributed to ease personal anxiety and health-and-safety-related social confusion.

Implications

○ Success factors: rapid and real-time creation of a linkage system based on field experience and experimentation

- **(Field experience)** Discussions about coping with the mask crisis were conducted based on ideas presented from the field of pharmacy rather than on desk theory; these ideas were rapidly embraced in actual decision-making.
- **(Experimentation)** Ideas based on field experience were implemented immediately and developed into systems that contributed to the resolution of the mask crisis through trial-and-error learning.
- **(Speed)** The processes comprising the presentation and execution of ideas, trial-and-error learning, corrective actions and re-execution were implemented in a short period, which led to an effective solution to the mask crisis.
- **(Real-time linkage system)** A comprehensive system was available to all public mask vendors, which prevented mask hoarding and resolved supply-and-demand imbalance by recording information on mask purchases, which was verified and shared in real time.

○ Limiting factors: lack of system stability and information accuracy, and constraints in private system and expert utilization

- **(System stability)** Measures were needed to counter system access errors and instability due to overload.[24]
  - In the early phase of building the DMPVS, some pharmacies experienced technical difficulties using the system due to connection delays caused by temporary overload.
- **(Information accuracy)** The accuracy of information entered in the system and the subsequent inconveniences for citizens needed to be improved.

[24] Yonhap News Agency (2020.3.11), "Duplicate mask purchase verification system 'delayed'...Government's 'rapid improvement' (comprehensive)."

- In the early phase of building the DMPVS, some citizens experienced problems due to the discrepancies between mask inventory identified through the DMPVS and actual availability in pharmacies.

– **(Utilization of private system and experts)** Measures need to be taken to remove legal and institutional constraints regarding the development of advanced and customized systems through the utilization of private systems and experts.

- There is a need to readjust standards for converting public institutions' systems to private clouds or establishing public and private information-sharing systems.

5. Five lessons from the Korean COVID-19 response cases

○ Success stories in overcoming the COVID-19 crisis are based on the following key factors: transparency, open, collaboration, participation, communication, speed and leaning. These factors played important roles owing to the infrastructure built under the national initiatives for government innovation, the institutionalization of innovation based on such strategies, and internalization based on lessons from innovation activities.

○ This paper draws the following lessons that should be sustained after the crisis.

○ Lesson 1. The importance of speed in solving policy problems

– A large organizations, such as government organizations, are driven by different interests and complex processes, thus leading to a long decision-making process and slowing down the response time.

- An agile response to policy problems can occur through rapid experiments.

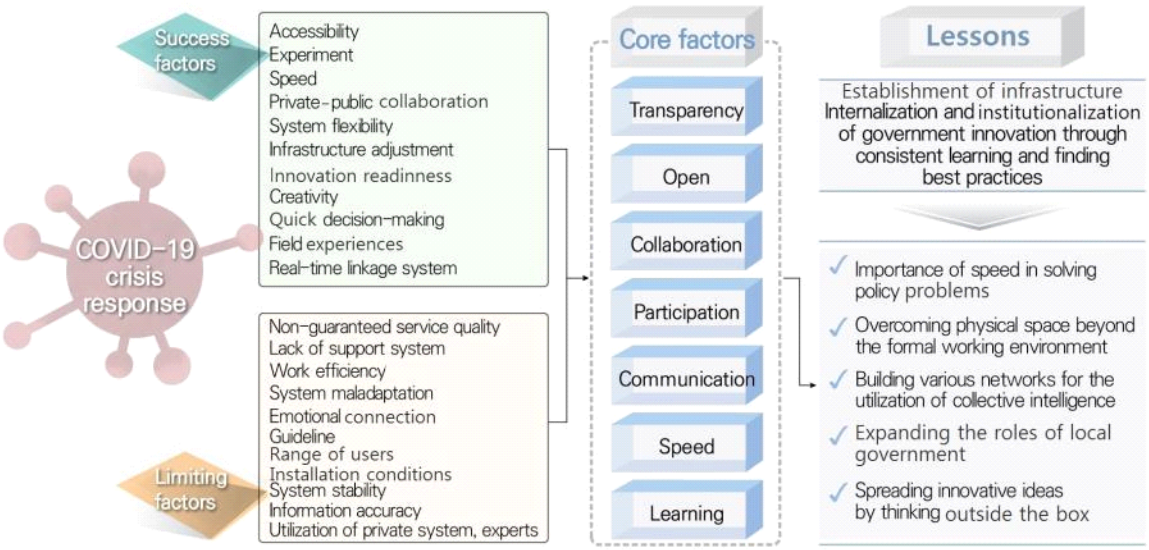
○ Lesson 2. Overcoming physical space beyond the formal work environment

– To maintain social distancing in the COVID-19 crisis, overcoming physical space through virtual working should be continued.

- This means transitioning beyond the traditional formal work environment to an environment in which diverse generations and devices coexist; a space where individuals and groups, work and life balance, and creativity and collaboration are possible.

○ Lesson 3. Building various networks for the utilization of collective intelligence

- Move toward openness by providing opportunities for creativity from diverse stakeholders and embrace different perspectives.
  - The government must be able to accommodate new external knowledge and use it to solve problems.
  - It requires the establishment of collaborative platforms, which allow citizens with creative ideas to participate in solving policy problems.



Source: Created by authors

<Figure 2> Korea Response to COVID-19: Factors and Lessons

○ Lesson 4. Expanding the role of local governments

- In a crisis situation, on-site judgement and responses are important to eliminate uncertainty in a short period of time.
  - In order to utilize the golden hour for stopping the transmission of the virus, it is necessary to grant authority to those working in the field such as local governments.

○ Lesson 5. Spreading innovative ideas by thinking outside the box

- The introduction of drive-through screening centers, which gained global recognition, was possible due to the significant role of on-site experts and government's support for implementing these innovative ideas in an open and cooperative manners.

  • The drive-through screening idea, introduced by a private healthcare expert, exemplified the free flow and rapid experimentation of innovative ideas through interactions within networks, autonomous execution, and benchmarking in the private sector that was unhampered by bureaucratic procedures and subsequent proliferation through government guidance.

  • Therefore, to be able to detect problems based on field expertise and seek optimal alternatives, the government needs to be open toward innovative ideas from outside and improve its problem-solving skills by systemizing the implementation of ideas (Cho, 2019).

03

Government innovation strategies in the post COVID-19 era

From the analysis of the Korean responses to the COVID-19, this paper presents six strategies of government innovation.

○ **Strategy 1: Strengthening the authority of the field**

- Field expertise can provide a new perspective on the policy issues and contributes to detect real problems and thus, find an innovative solution. In the COVID-19 crisis, these people's ability to respond has been well demonstrated.
  - Field experts need to have more opportunities for collaborative innovation, which needs to be supported and coordinated by facilitative leadership of higher-level organizations.

○ **Strategy 2: Establishing a real-time prediction analysis system**

- It is important to have an immediate detection-and-response system that can be used for both checking the effects of policies as well as citizens' response to those policies by combining past and real-time information.
  - To speed up innovation, big data platforms that can predict and analyze in real time need to be expanded to all government-level platforms rather than scattered in several different departments.

○ **Strategy 3: Continuing the Government's cloud system**

- The Korean government is currently pursuing a "cloud-first" policy. The cloud is a key element of infrastructure that can support new national ICT convergence industries such as those focusing on big data, the Internet of Things, and intelligent information and communication, which require large data resources.
  - To secure free space for large amounts of data while maintaining security, it is necessary to build a cloud system that integrates the entire public sector.

■ **Strategy 4: Step-by-step strategy for time and business management**

- A detailed guide is needed that improves work practice and efficiency and expands time management to include elements like the existing smart office and flexible work system.
  - Examples of these changes include improving work flow through telecommuting and video conferencing, continuing education and campaigns to enhance emotional connection skills and sense of belonging, supporting connectivity, and maintaining business etiquette.

■ **Strategy 5: Developing modules for open innovation**

- The open innovation that emerged during the COVID-19 response process is a crowdsourcing form of public–private collaboration that embraces capabilities and ideas outside the government and combines them with resources and functions within the government.
  - Crowdsourcing is an effective means when problems are clearly defined, collaboration is simplified, and the knowledge required to solve a problem exists outside the government (Liu, 2017:659).
  - Detailed modules need to be developed that will allow more effective open innovation, thus, making it possible to create and disseminate innovative ideas, derive creative solutions to policy problems, and co-produce services and policy agendas (Liu, 2017: 656).

■ **Strategy 6: Innovation by learning through iterative experimentation**

- In the course of the COVID-19 response, it is evident that policy experiments through iterative process are effective by searching for innovative ideas, testing them with stakeholders, and developing more pertinent solutions while gradually decreasing errors.
  - Therefore, it is necessary to encourage public officials to innovate through trial and error not only in crisis response processes, but also in normal policy processes.

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