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# Policy learning and crisis policy-making: quadruple-loop learning and COVID-19 responses in South Korea

Sabinne Lee[a], Changho Hwang[b] and M. Jae Moon[c]

[a]Associate Research Fellow, Korea Institute of Public Administration, Seoul, South Korea; [b]Assistant Professor, Dong-A University, Busan, South Korea; [c]College of Social Science, Yonsei University, Seoul, South Korea

**ABSTRACT**

This study aims to analyze how the Korean government has been effective in taming COVID-19 without forced interruptions (i.e. lockdowns) of citizens' daily lives. Extending the theory of organizational learning, we propose the quadruple-loop learning model, through which we examine how a government can find solutions to a wicked policy problem like COVID-19. The quadruple-loop learning model is applied to explain how the Korean government could effectively tame COVID-19 in the initial stage through its agile as well as adaptive approach based on effective interactions of backstage (time, target, and context) and frontstage of policy processes mainly focusing on the initial stage until the highest alert level was announced. Based on the Korean case, this study also examines critical factors to effective learning organizations such as leadership, information and transparency, as well as citizen participation and governance.

*Success consists of going from failure to failure without loss of enthusiasm.*

*Winston Churchill*

## Introduction

South Korea is currently regarded as one of the most successful cases in the fight against COVID-19, with agile responses, transparent risk communication, and voluntary citizen participation in non-pharmaceutical interventions (NPIs) like social distancing (Moon, 2020). Since the first confirmed patient was found on 20 January 2020, the Korean government has taken an agile and aggressive approach, testing and tracing anybody who has potentially been exposed to COVID-19, and then treating confirmed patients in designated facilities depending on their medical conditions. This proactive approach has led to remarkable success in taming COVID-19. Korea has taken advantage of lessons learned from its painful experience with MERS in 2012, continuing to find practical and innovative solutions for COVID-19, which is unprecedently contagious and became a pandemic in a short time. Though the daily number of newly confirmed patients in Korea quickly increased to about 1,000 in the middle of March 2020, it went down to

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single digits in May 2020 (Moon, 2020). Conversely, in the U.S., which found its first confirmed case about the same time as Korea, the daily number of the new confirmed cases has not been controlled easily because of a slow and passive initial response to COVID-19. This led to a difference, not only in the number of confirmed cases, but also in the COVID-19 fatality rate, which is about 2.3% in Korea and 5.6%, or approximately 2.5 times higher, in the U.S as of June 9th, 2020.

Proposing the 'quadruple-loop' learning model as an extension of organizational learning, this study shows how the Korean government managed the COVID-19 crisis effectively by reducing the total number of confirmed patients and the fatality rate without resorting to the forced lockdowns adopted by many other countries. The quadruple-loop organizational learning model is a comprehensive and continuous learning mechanism that incorporates past experiences, political and social contexts, and specific characteristics of new problems in the course of finding ultimate solutions. Highlighting the Korean government's agile but adaptive policy-making processes in fighting against COVID-19 by increasing the alert levels from blue to red, this study proposes and discusses the nature and operating mechanism of the quadruple-loop organizational learning model, as well as its contributions to this success.

In this study, we examine critical components that facilitate or constrain organizational learning, including the process of creating, retaining, and transferring knowledge (Argote, 2011). Along with this process, the organization also notes past failures, acknowledges success and failure factors, and shares this information to perform better and reduce the possibility of further failures. As Argote (2012) states, organizations can grow and mature in a competitive and ever-changing environment by implementing objective and self-reflective learning.

Since the post-COVID-19 era is expected to remain one in which no one can predict what will happen, sustainable organizational learning is one of the key strategies that should be used to cope with its constantly changing and increasingly complex problems (McKinsey and Company, 2020) such as so called 'wicked problem' that Rittel and Webber (1984) suggested. As the Korean case demonstrates, governments must be prepared to become innovative organizations equipped to learn, adapt, and change in order to perform and thrive better when facing various difficult, wicked policy problems like COVID-19.

## The policy challenges of COVID-19

COVID-19 began to develop in Wuhan Province in China, with the first case identified on 12 December 2019. Though COVID-19 is a member of the coronavirus family, along with SARS in 2003 and MERS in 2015, it is distinctive in terms of the degree of contagion and pattern of infection, including asymptotic infection. The World Health Organization (WHO) officially declared COVID-19 a pandemic on 11 March 2020, and confirmed cases reached over 5 million five months after the first outbreak.

As of 2 0 June2020, the tentative mortality rate is about 6.4% (Worldomesters, 2020), or about 350 times the death rate (0.02%) of the H1N1 flu (Kelland, 2013). As shown in Table 1, the infectiousness of COVID-19 has the highest severity among the three similar types of coronavirus diseases: SARS, MERS, and COVID-19. The table suggests that the total number of both infected cases and dead from COVID-19 is much higher than those

**Table 1.** Comparison of SARS, MERS, and COVID-19.

|  | SARS | MERS | COVID-19 |
|---|---|---|---|
| Time of the outbreak | 2002 | 2012 | 2019 |
| Place of the outbreak | China | Saudi Arabia | China |
| Infectiousness | | COVID-19　MERS>SARS | |
| N of infected cases/N of dead | 8,439/812 | 2,519/866 | 8,750,882/461,818 |

from SARS and MERS. The numbers in this table are based on Hedwings-Martin (2020) and Worldomesters (2020).

It is not clear when vaccines will be developed (McKie, 2020), although 78 vaccine projects have been launched, as reported (Le et al., 2020) in *Nature* as of the time of writing.

Because of its geographical location, Korea was one of the first countries hit by Chinese-origin COVID-19. Since December 2019, the cumulative number of confirmed cases in Korea has risen to over 10,000. As of 26 May 2020, 269 people had died, and 839,475 had tested. However, the daily number of new confirmed cases has not been increasing continuously. Rather, it peaked in late February and early March, then flattened from the beginning of April 2020, as shown in Figure 1. From January 20 to February 14, there were few confirmed cases, but the number of confirmed patients increased steeply right after that. This was due to a Shincheonji mass infection in Daegu, Korea (Lee, 2020). A confirmed patient who had refused to take a test participated in Shincheonji church worship, and the virus spread to people who also attended worship that day. The infected patients transmitted the virus all over the country, so the number of patients started to increase rapidly from that point. But two weeks later, the number of confirmed cases lessened, and after two more weeks, it flattened.

The WHO reported the Korean case as one of the incredible success in handling COVID-19, and the UN also termed it a 'success story' (Le Duc, 2020). Despite the rich media coverage and the growing need for in-depth studies, however, there has not been
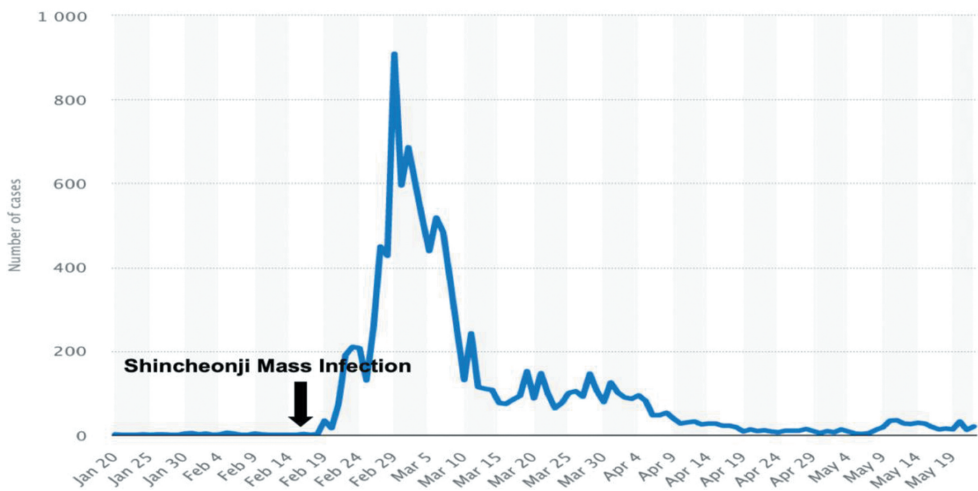


**Figure 1.** Number of confirmed cases in Korea. Source: Statistica (2020).

enough research done to produce a profound theoretical understanding of the case. Responding to this, we aim to analyze how the Korean government solved this problem stage by stage, particularly in the context of the interaction between government organizations and the external environment. In particular, we believe that previous experience dealing with MERS in 2012 and continued adaptive policy learning were critical factors that made the Korean case distinctive.

## Theories of organizational learning

Organizational learning, a process of 'creating, retaining, and transferring knowledge within an organization' (Argote, 2011, p. 441), is critical to organizational performance. As Argote (2011) pointed out, an organization develops as it gains experiences from organizational learning by reflecting on past failures, accumulating success and failure factors, and sharing this information to perform better and reduce the possibility of failure next time. Similarly, Argote (2012) also stated that organizations grow and mature and remain competitive in an ever-changing environment through objective and self-reflection learning.

The organizational learning literature has largely developed into two categories, one dealing with organizational learning and the other with the learning organization. The first sheds light on the 'adaptability [of] organization[s], method to reinforce organizational learning, and positive action bias' (Moynihan, 2005, p. 214). In other words, it mainly focuses on how organizations gain experiences, undergo failures, and learn to survive. The second responds to the pressures of being competitive and innovative to survive that modern organizations face. The learning organization literature often introduces various strategies for enhancing an organization's learning capacity (Argyris, 1991; O'Keeffe, 2002; Senge, 1990). For instance, sharing the vision to motivate staff (Senge, 1990), and constructing team learning and team meetings through which members grow and share knowledge more quickly (O'Keeffe, 2002) are often cited examples of how to make organizations better 'learning organizations.'

This study focuses on organizational learning to analyze how the Korean government learned from past policy failure and how this shaped its adaptive policies. We also examine factors critical to effective learning organizations. In the following section, we introduce single, double, and triple-loop organizational learning as a basis for the quadruple-loop learning which is proposed as a theoretical framework for this study.

### Three types of policy learning

In his foundational work on learning organizations, Argyris (1976) asserted that the learning process in an organization is not a one-time phenomenon, but rather one that happens through multiple loops or iterations. First, in single-loop learning, the relationship between actions and results provides an answer to problems, but in a superficial way. In this stage, actors mainly focus on whether they are doing the right things to make things work. In double-loop learning, people dig for more permanent and innate solutions. Unlike single-loop learning, which can only provide limited solutions, double-loop learning suggests better solutions by shedding light on changing assumptions that enable

people to avoid the negative consequences of single-loop learning (Argyris & Schon, 1974).

Argyris (1991) used an example of the temperature in a room to explain the difference between single-loop and double-loop learning:

> [A] thermostat that automatically turns on the heat whenever the temperature in a room drop below 68 is a good example of single-loop learning. A thermostat that could ask, "why am I set to 68?" and then explore whether or not some other temperature might economically achieve the goal of heating the room would be engaged in double-loop learning. (Argyris, 1991)

This suggests that a double-loop learning process aims to question assumptions and seek new solutions if necessary, while single-loop learning is often thought of as a learning process involving a higher risk of not considering new factors (Choularton, 2001). However, double-loop learning is also limited in that it does not fully reflect changes in the external environment, because it occurs only within the organization. Inspired by Argyris and Schon (1974), Tosey, Visser, and Saunders (2012) proposed triple-loop learning, and specifically emphasized the significance of active organizational responses to changes in the external environment. In solving various problems, organizations often not only take actions based on standard operating procedures and previous experiences (single-loop) or change assumptions and principles, but also can reassess their culture, structures, principles, visions and even paradigms (triple-loop learning) (Kusters, Batjes, Wigboldus, Brouwers, & Baguma, 2017). With this method, organizations search beyond their internal learning structures. Ultimately, as Kusters et al. (2017) argued, they can develop strategies for responding and adapting to a dynamic external environment.

### Quadruple-loop learning

Despite the comparative advantage of triple-loop learning, however, it still has some limitations as well. For example, this model does not specify the linkage between context-specific learning mechanisms and double-loop learning. It also does not incorporate a continuous learning mechanism, which is a critical element in constantly searching for solutions under a high level of uncertainty and complexity. The external environment and the organization interact with each other incessantly until a problem is solved. In this sense, it is necessary to revise, redefine, and expand current triple-loop learning.

Quadruple-loop learning happens when the nature of the new problem (target), context, and past experiences jointly affect a particular organization in the course of searching for solutions to an emerging problem. The type of crisis is important to organizational learning because it often determines relevant strategies (Kim & Moon, 2015). Moynihan (2005) also stressed the importance of differentiating government responses by the type of crisis, such as infrequent disaster and routine disaster. Second, various contextual characteristics of an organization can facilitate or constrain organizational learning. The political context is often important to understanding how the government deals with transboundary, unique, uncertain crises (Olsen, 2007), mainly because crisis management happens in such a context (Christensen, Lægreid, & Rykkja, 2016). For example, the Trump administration's policy choices might be affected and often limited by political calculations concerning the coming presidential election, while the Abe administration's initial response to COVID-19 appeared

to be affected by the international debates about the possibility of rescheduling the Tokyo Summer Olympic Games.

Lastly, past policy experiences (*time*) are closely associated with institutional memories (Hardt, 2018) and policy learning (Bennett & Howlett, 1992). As Moon (2020) stated, one of the most important factors that drove Korea's success in the 2020 COVID-19 crisis was its learning from past failure in the 2015 MERS crisis. After the first patient was reported in April 2015, the MERS outbreak claimed more than 180 victims (MSWH, 2016). The Korean government subsequently published a MERS whitepaper that outlined key lessons and policy recommendations to protect the people from similar possible disease disasters that might occur in the future. Based on these policy recommendations, it restructured its operations to strengthen the autonomy and authority of health professionals (MSWH, 2016; Moon, 2020). This bold organizational restructuring is acknowledged as one of the most important factors that helped it to handle the COVID-19 disaster efficiently and effectively (Fisher & Choe, 2020).
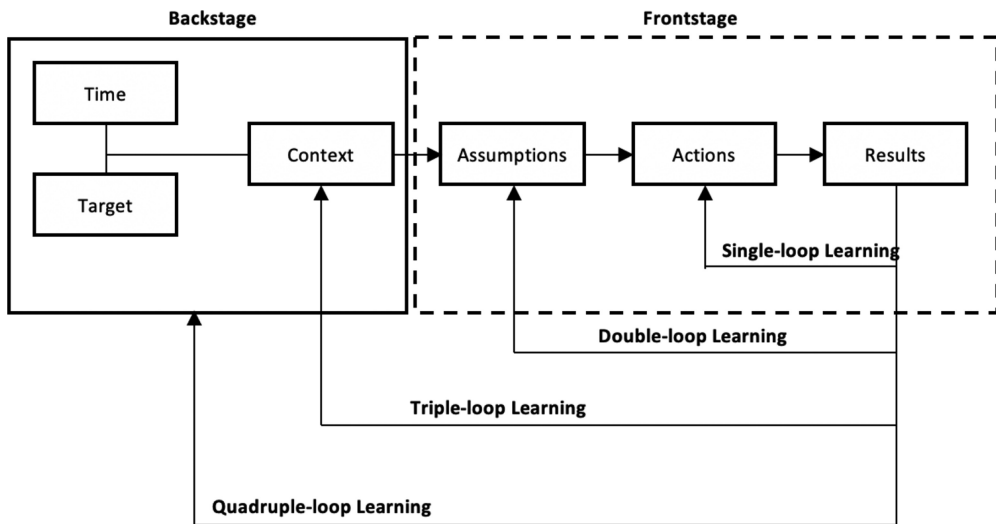


**Figure 2.** Quadruple-loop learning process.

As indicated in Figure 2, targets, context, and time that lie outside the frame of an organization constitute the backstage of organizational learning. This is critical to shaping the frontstage of organizational learning, which refers to the traditional process of double-loop learning that occurs inside the organization. The backstage components affect the frontstage, with the result that learning is continued over time until the organization draws ultimate, plausible, and complete solutions. In the procedure of quadruple-loop learning, as shown in Figure 2, the organization starts to implement frontstage learning, setting assumptions to produce results. The three elements (target, context, time) of backstage learning affect the organization.

As Figure 3 show, the learning process repeats until the problem is resolved. In other words, quadruple-loop learnings occur through continuing learning processes where a
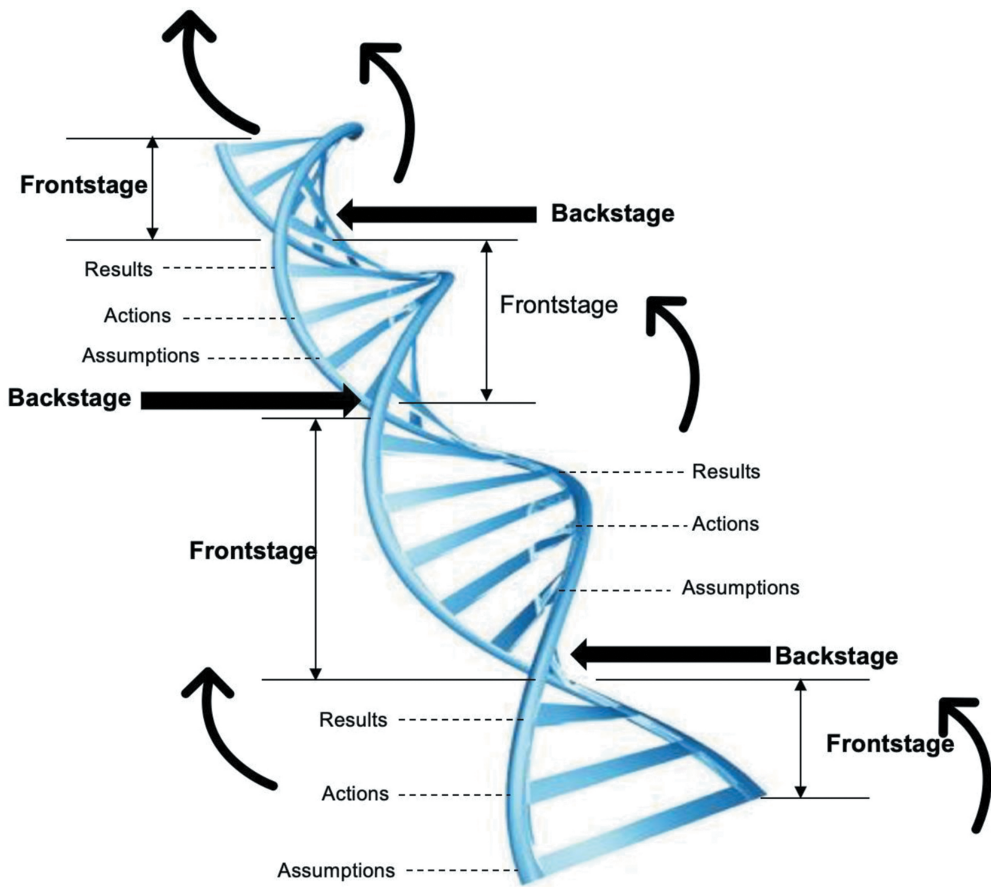
**Figure 3.** The continuity of quadruple-loop learning.

series of multiple interactions of backstages and frontstages take place as an organization discovers new information or experiences of new situations in coping with a particular policy problem.

The following section will discuss how the Korean government responded to COVID-19 both in the backstage and frontstage. Figure 4 summarizes the Korean government-made initial policy decisions and actions according to increased alert levels. The quadruple-loop learning model will be applied mainly to analyze initial policy decisons and actions taken in the course of increasing the alert levels from the blue level on January 8 to the red level on February 23, 2020. Also, the figure includes Korean government's responses through the continued quadruple-loop learning after WHO declared COVID-19 as a global pandemic. Selected details on the quadruple-loop learning in both backstages and frontstages will be discussed in the following section.
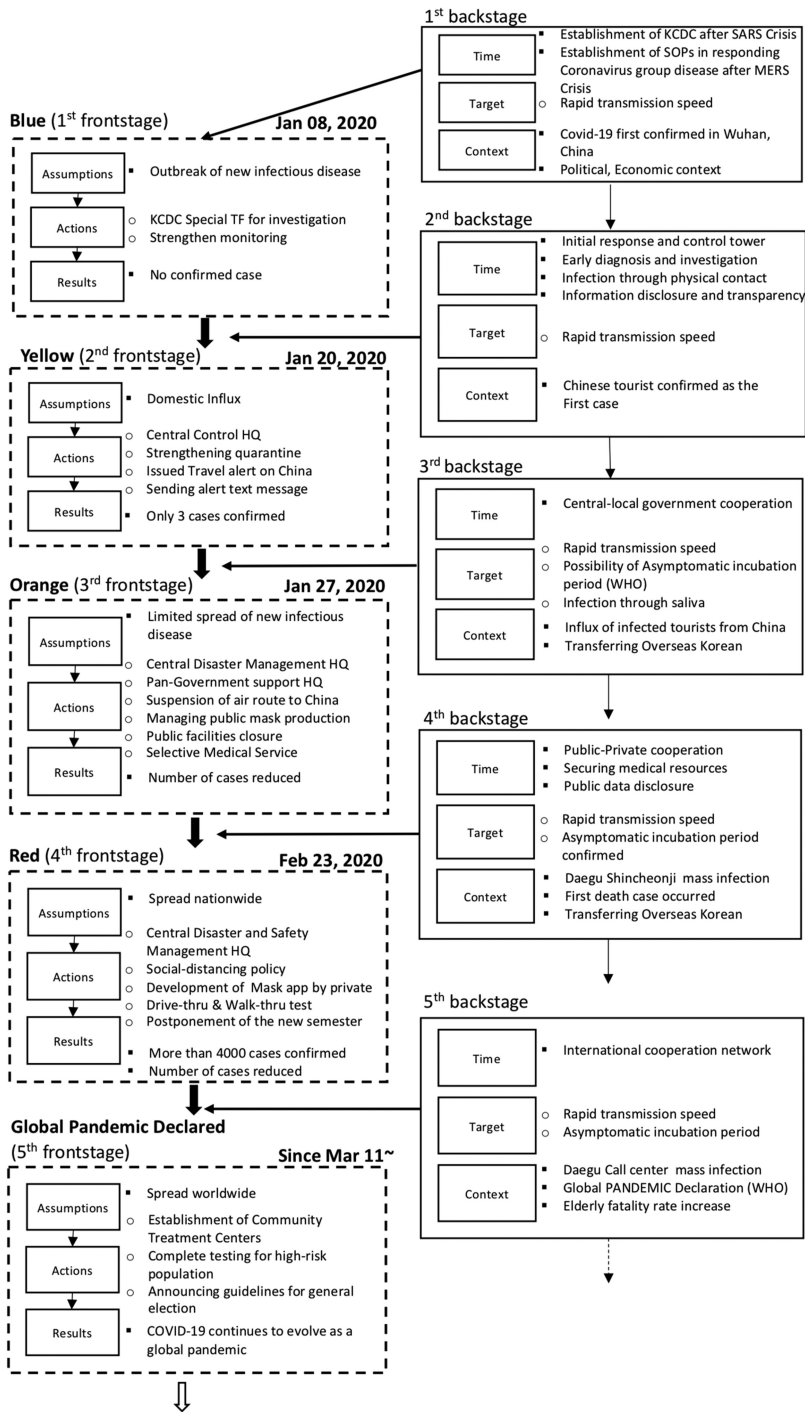
**Figure 4.** The continuity of quadruple-loop learning.

## Quadruple-loop learning in COVID-19 responses in South Korea

### *Quadruple-loop learning: the backstage*

#### *Time*

As mentioned above, Korea had already accumulated information on the characteristics of coronaviruses through the SARS and MERS crises of the past. The Korea Center for Disease Control and Prevention (KCDC) was founded after the SARS crisis of 2003. This is the basic institutional foundation used to handle disease outbreaks. When the SARS crisis occurred in Korea, only two or three researchers from the National Institute of Health were in charge of infectious disease and quarantine policy. President Roh Moo-hyun developed a temporary emergency response system that combined central and local governments, public hospitals, and the army, and was later evaluated as a successful model by the World Health Organization. However, President Roh promoted the establishment of the KCDC, which would perform systematic research and respond to infectious diseases. The KCDC was finally established in December 2003 as a result of these efforts. During the MERS and COVID-19 crises, the KCDC played a major role in evaluating the situation and also took charge of quarantine policies. Further, President Moon acknowledged the importance of constructing a power hierarchy based on professional knowledge and experience during the COVID-19 crisis, and decided to give the KCDC the status of a vice-ministerial agency (Ahn, 2020).

Although the KCDC was established after the SARS crisis, this startup organization showed several limitations in its response to the MERS crisis. Since coronaviruses are transmitted through the respiratory system, testing suspected patients and tracing confirmed cases was critical. Unfortunately, the KCDC lacked the resources needed for a large epidemiological investigation (MSWH, 2016). For this reason, accurate data on the movements of confirmed patients could not be collected. To make matters worse, tensions between the central and local governments hindered the transparency of their information disclosure. For instance, the mayor of Seoul harshly criticized the central government and asked it to disclose information about confirmed patients' movements (Moon, 2020). Although the central government accepted the mayor's opinion and decided to disclose the information to the public, this delay caused MERS to spread rapidly (MSWH, 2016). But as Moon (2020) has pointed out, the disastrous MERS experience was a painful yet educational experience. Based on the knowledge acquired from this event, the Korean government used the KCDC to monitor the progress of COVID-19 and disclosed patient movement data via various sources, including warning text messages and mobile applications. In this way, it persuaded citizens to identify and assess their possible exposure to the virus. This allowed the government to successfully reduce transmission speed.

#### *Target*

The coronavirus is a type of cold virus that commonly appears among both humans and animals (Broadbent, 2020). This virus invades the respiratory system and usually causes high fever, headaches, muscle pain, and shivering. Although COVID-19 is related to SARS and MERS, it has some characteristics that make it more severe than past viruses. COVID-19 has a much higher transmission rate than SARS and MERS. Specifically, the SARS coronavirus infected four people in two and a half months, and the MERS

coronavirus infected 186 people in about six months in Korea. Since its outbreak in January 2020, COVID-19 has infected more than 12,000 patients in Korea, and more than 8 million people globally as of June 15 of 2020. This rapid transmission speed is partially due to the asymptomatic nature of COVID-19. Since the COVID-19 virus does not produce any symptoms during its incubation period, patients have continued to move and work without even knowing they are infected. In this sense, social distancing and limiting contacts with infected people are the best way to avoiding contamination and spreading the disease. Due to this, the Korean government not only reinforced tests and confirmed procedures, but also tried to persuade people to stay apart from one another and avoid social gatherings. This was achieved through a social distancing campaign.

### Context

The context of the Korean government was also a very important factor that affected the frontstage organizational learning. Firstly, most of Korea's GDP relies on international trade and export. According to Goh (2019), Korea's trade dependence is close to 70%, which marks the third-highest among the G-20 countries. Particularly, exports to China account for 11% of the country's GDP, and imports from China account for 6%. Because of this high level of trade dependence of the Korean economy, the government had to be cautious about strict closure of borders like preventing Chinese people from entering Korea. It had to find a way to prevent the spread of the epidemic, but not hinder its relationship with China and other countries (Seong, 2020).

Secondly, Korea is a free democratic country where a lockdown policy was the last option the Korean government could choose. For this reason, the government could not easily make policy choices to seal the borders of cities and restrict citizens' movements as the Chinese government did in Wuhan in January 2020, or as other countries such as Vietnam chose to do to reduce transmission of COVID-19. We note that some democratic countries inevitably had to choose lockdown to slow down the spread of disease, and suffered the resulting economic damage. For instance, the Italian government has blocked off ten cities in the regions of Lombardy and Veneto since February 2020, which led to a massive sacrifice of the Italian economy (Bertelli, 2020).

Thirdly, the Korean government was well prepared to respond the COVID-19 crisis thanks to experience and knowledge gained from the past failure. For example, the establishment of KCDC and various standard operation procedures (SOPs) for quick tests, tracing and treatments were some of key elements that led to its successful crisis response.

### Quadruple-loop learning: the frontstage

As described above, the Korean government learned several lessons from the painful failure of its responses to the SARS and MERS crises. As a result, the KCDC was established to deal with infectious disease policy and research, and provided considerable information about the general characteristics of the coronavirus family. This left Korea well positioned to respond when, in December 2019, the Wuhan Municipal Health Commission reported a cluster of cases of pneumonia in Wuhan. The following month, the World Health Organization officially confirmed the outbreak of COVID-19

in Wuhan, declaring it a public health emergency of international concern. The Korean government adapted its policies as the external situation changed.

On January 8, the KCDC learned about the outbreak in Wuhan, China. It declared the first stage of crisis alert (Blue) and organized a special task force. It also strengthened monitoring in airports to prevent infections (Cha, 2020). No patients were confirmed at this stage. On January 20, however, a Chinese tourist quarantined for suspicious symptoms after entering Korea was confirmed as the first case of COVID-19. The KCDC acknowledged the domestic occurrence of the virus and declared the second stage of crisis alert (Yellow) to minimize the scope of infection. The Central Control Headquarters (CCHQ) started to operate on January 20, with Director Chung as head manager under the oversight of the KCDC. The KCDC and CCHQ strengthened quarantine policies and issued a travel alert on China on January 23. In addition, central and local governments started to send crisis alert text messages to citizens to remind them of the rules for keeping public health and of the severity of COVID-19. From January 20 to January 27, there were only three confirmed cases.

The Korean government did not ban the entry of Chinese tourists, and some additional infected tourists entered the country. For this reason, the Korean government faced harsh criticism from conservative citizens. However, President Moon announced that the government would not ban Chinese entry. Instead, he said it would strive hard to minimize the risks by strengthening quarantine policy in cooperation with the Chinese government. The President also urged the Korean people during his New Year speech to trust the government and not be overly anxious about the current situation (The Blue House, 2020).

As the influx of Chinese tourists continued, and the Korean government decided to bring home Koreans who were living in China, the number of infected cases slowly increased. On January 27, the KCDC declared the third stage of crisis alert (Orange) to limit the spread of the new disease. At this stage, the Central Disaster Management Headquarters (CDMH) was established under the oversight of the Ministry of Health and Welfare. The CDMH is responsible for supporting the quarantine services of the KCDC and preventing the spread of infection in the local community. The CDMH recommended that local governments close public facilities. To be able to process tests as soon as possible, the Korean government also encouraged the private sector to develop effective test kits and promised rapid approvals. Based on these efforts and actions of the government, the number of confirmed cases fell. However, on February 18, the so-called Shincheonji mass infection occurred in Daegu, one of the largest cities in the southern part of Korea. The Shincheonji church has approximately 240,000 believers. It was confirmed that patient No.31, a member of the Shincheonji church, had symptoms but refused to be tested and had gone to church to worship.

The day after the Shincheonji worship took place, 20 additional confirmed cases were discovered, and many more cases were confirmed around the church in Daegu. The number of confirmed patients, which was initially 30 people, increased significantly, and the number of confirmed cases soon became the second largest in the world that in after China, and the world's largest in terms of percentage of the total population. Facing this crisis, the Korean government declared the last stage of crisis alert (Red) on February 23 and promised broader responses. The pan-governmental Response Taskforce was launched in late February. In addition, the central government ministries were united,

and cooperatively implemented policies to prevent the spread of infectious diseases. For instance, the Ministry of Education decided to postpone the new academic semester until June, and the Ministry of Interior and Safety announced its plan for supplying resources such as medicines and its support of self-isolation, workplace quarantines, and waste treatment.

The KCDC recommended social distancing policies and distributed guidelines to local governments and citizens. As a part of the social distancing policy, the KCDC strongly recommended suspending the operation of multi-person facilities such as churches and gyms. As well, efforts were made by the ministries to alleviate the damage to the private sector caused by the crisis. For instance, the Ministry of Science and ICT announced plans to support ICT companies affected by reductions in exports and imports. Efforts were also made to recognize the limitations of the current state and prepare for the future. On February 26, the so-called Corona 3 Act was passed by the National Assembly. The Act revised the Prevention and Management of Infectious Diseases, Quarantine, and Medical Acts to respond to COVID-19. As a result of these rapid responses, the number of confirmed cases was reduced and is still decreasing.

In sum, the Korean government changed its assumptions and actions as external environment changes to produce best results. Since these assumption changes were specified in its *Guidelines for Responding to New Infectious Diseases*, published by the Korean government, it was still up to the government's discretion to figure out what was happening at each stage and how it would affect the domestic situation. Also, policy decisions at each stage were chosen based on the government's awareness of objective reality and following adaptive policy-making principles to minimize risks and damages. In this sense, adaptive policy-making in quadruple-loop learning includes both detecting changes in external environments (backstage) and activating a relevant internal response system, and finding adaptive solutions to solve problems organization face at each stage. The Korean government continued to make policy decisions and related actions such as the establishment of community treatment centers for mild cases, complete testing for high-risk population (i.e., those in nursing hospitals and entrants from foreign countries), and adjusting the degree of NPIs as the number of confirmed cases changes. The quadruple-loop learning is expected to continue until the COVID-19 stops.

## Critical factors to initial success in taming COVID-19 in South Korea

### Actors and leaders

According to Curristine (2005), strong leadership is a core element that affects the success of performance management. Specifically, one of the critical components that determine the failure or success of policy learning is the organization's choice of a leader. As Curristine (2005) pointed out, good leaders are the one who take the uncountable into account, quickly identify core bits of information, motivate professionals, and hold people to account in a fair way. The role of the leader is also important to ensure that lessons from organizational learning become a reality. Even though learning occurs within an organization's structure, political power determines whether its results will be implemented or not, and also affects what types of learning process are implemented (Moynihan, 2005). Giving authority to the right person, who can analyze possible

alternatives and determine the optimal learning process, is one of the most important aspects of organizational learning. Leadership is even more important in crisis situations. In crisis management, implementing relevant policies in the so-called 'golden time' will determine whether organizations are successful or not (Garcia, 2006). Since crises tend to worsen very quickly, and their risks are high, leaders need to collect information and make timely decisions based on field-based professional knowledge, skills, and often intuition. In crisis circumstances, power and authority must be given to qualified persons.

It was known that President Moon's strategy for scientific evidence over politics is a key success factor of Korea's successful response to COVID-19 (Kealey, 2020). President Moon, the 19th president of South Korea, was fully aware of the importance of relevant, professional-centered crisis management even before he became president. When he was the leader of the opposition party, the MERS crisis hit South Korea. Moon visited the KCDC and listened to briefings by experts. After being elected president in 2017, he appointed Chung Eun Kyung as Director of the KCDC. In addition, he delegated decision-making power to public health experts and let the KCDC have the authority to coordinate crisis response, establishing it as his prime monitoring system. In a special speech marking the third anniversary of his inauguration, President Moon declared that his administration is willing to promote the KCDC to agency status to strengthen its professionalism and independence, while he aims to expand professional manpower and build a regional system to strengthen national capacity for controlling infectious diseases (Ji, 2020).

Director Chung was highlighted as a 'real hero' who led the KCDC to success (Walker, 2020). In her professional career in KCDC, she experienced both the SARS and MERS crises, while becoming experienced in controlling crises as a bureaucrat. President Moon had high regard for Chung and appointed her as Director of the KCDC. As Moon (2020) noted, the past failure experiences of responding to MERS helped Director Chung to make sound decisions during the COVID-19 crisis. For instance, during the failure of the MERS response, she discovered that MERS patients moved to other places while contaminated, and patients could be transferred to different hospitals without any notification from the agency (Kim & Lee, 2020). Based on these painful experiences, Director Chung quickly decided to trace the flow of the possible patients and then distributed this data to the public through text messages, the government's webpage, and mobile applications. At the same time, she encouraged local biotech companies and researchers to develop effective test kits as soon as possible. Her decision generated accurate information and a high level of transparency that is globally considered as one of the most important success factors of Korea's response to COVID-19 (Fisher & Choe, 2020).

### Information and transparency

According to Moynihan (2005), the structure in which organizational learning occurs comes from 'legislative and administrative mandates that create formal rules and procedures to generate, collect, and disseminate data' (Moynihan, 2005; Radin, 1998; Snell & Grooters, 2000). Information and data form the core that enables organizations to reflect and learn from the behaviors. As Argyris (1991) pointed out, the lack of information may cause noise, overload, and bounded rationality. Lipshitz, Popper, and Oz (1996) therefore

argued that organizations will be effective if they are allowed to systematically collect, analyze, store, disseminate, and use information.

Active organizational communication is a hidden contributor to this gathering of relevant information. If internal communication fails, this will lead to restricted organizational learning (Choularton, 2001). An effective crisis management leadership strategy thus requires active communication and a smooth flow of information. An authoritarian response would certainly be faster and more consistent, but it would require higher transaction costs in collecting information. Leaders active during crises thus need to cultivate a democratic, flexible perspective rather than a hierarchical, rank-based, and standard procedures-oriented one. This encourages the rapid flow of information and communication (Waugh & Streib, 2006). A transparent, open culture is also needed for solidifying information-based, well-structured organizational learning. As Moynihan (2005) noted, even though information and data form the basis of organizational learning, collecting them is not as automatic as it seems.

Facing the COVID-19 crisis, the basic pillars of the Korean government's COVID-19 policy were openness, transparency, and democracy (The Blue House, 2020). When a possible patient tested positive, the government traced his or her movements based on the records of smartphones and credit cards (Brazinsky, 2020). The KCDC then analyzed the patients' movement data and held daily briefings for the media. Central and local governments disseminated area-specific information via mobile emergency alerts while keeping identification information is protected. This was possible due to close collaboration with related government agencies, and mobile network providers, and credit card companies (UNDP, 2020).

The Korean government used diverse platforms for rapid and efficient information disclosure. Specifically, the government used not only traditional media channels but also new media channels such as mobile text messaging, social networks, mobile applications, and central/local government websites. The diversity of information disclosure platforms increased the accessibility of information, which helped citizens to enhance their awareness as well as to reduce their infection risk.

### Decision-making processes and governance

One of the reasons why building healthy governance is effective for organizational learning is that it can accelerate systematic information collection. Since information is generated in various parts of the organization, and various steps take place in the organizational learning process, a well-designed network system and efficient governance are key elements needed to make information collection fast and cost-effective.

Even though drawing implications from past experiences and solidifying the organizational learning process are important tasks, they will be useless if the organization's members do not participate. As mentioned above, interpretation of the political context and political skills are needed to implement the lessons acquired through organizational learning. However, where democracy is operating as a core political ideology, the support of the public and private sector is ultimately key to determining whether a newly adopted learning process is sustainable or not. In this sense, as Wu, Ramesh, and Howlett (2015) argued, understanding how key actors interact and what ideology they have is the essential virtue that successful public managers have.

In Korea, governance is another hidden hero of the successful COVID-19 response. First, the governance of information collection in general is very robust in Korea. The private sector also played an important role in respect to the COVID-19 crisis. For instance, IT firms such as NAVER provided servers to encourage the diffusion of patient movement information. In addition, the time-efficient test kits were developed by pharmaceutical firms. Normal citizens also participated in developing strategies to fight COVID-19. For example, a university student developed a mobile application that citizens could use to access information on confirmed patients. The celebrated concept of drive-through testing was also a citizen's idea.

The Korean people also contributed to the effective initial mitigation of COVID-19 by following government guidelines and policies. As mentioned above, the Korean government recommended a high level of social distancing after the Shincheonji mass infection occurred. Most of the Korean people followed the government's guideline in their everyday lives by staying home, minimizing social gatherings, wearing facial masks, and keeping self-quarantined if they experienced suspicious symptoms, wore masks, and washed their hands regularly.

Citizens were also very cooperative in managing a nation-wide general election for parliamentary members which was held on 15 April 2020. The Korean government set up guidelines to secure public health during the election by preparing specific steps citizens had to take in voting sites from checking their body temperature, sanitizing hands, wearing plastic gloves, and distancing with other voters. Despite arising concerns about COVID-19 and its possible effect on low turn-out rate, it was the highest general election voter turnout of the 21st century, which demonstrates successful management of a nation-wide election amid of COVID-19. The general election was well done without spreading the disease thanks to these efforts (Snyder, 2020).

## Conclusion and discussion

This study examined how the Korean government successfully responded to the COVID-19 crisis based on organizational learning theory, and showed the specific components of Korean government and society that encouraged effective organizational learning. We suggested that a quadruple-loop learning model which highlights the scope of the 'context' and demonstrates the interaction between internal, frontstage learning and external, backstage learning is an excellent one to help understand the Korean experience. We further suggested that the continuous interaction between frontstage and backstage learning is a key characteristic of quadruple-loop learning and leads to successful initial responses. Responding to new developments of COVID-19, the Korean government has been continuously revising its assumptions and taking necessary actions whenever new information is unfolded or new external unpredictable factors are revealed. As a result, Korea's crisis management policy is considered one of the most successful cases of proactively mitigating COVID-19 without substantive disruptions in daily economic, political, and social activities of citizens.

Several other factors also led to Korea's success. For example, president Moon and his administration tried to make critical policy decisions based on the evidences and judgements provided by professionals of medicine and science commuinities. Medical and administrative capacities were also critical to the initial success. It should be also noted

that private-sector firms and even normal citizens actively participated in public policy-making processes and voluntarily complied government's guidelines and campaigns for NPIs such as mask-wearing, personal sanitizing, and social distancing.

We also believe that learning capabilities are critical to effective learning and eventually organizational and institutional outcomes. Future studies need to explore how learning capabilities affect organizational and institutional outcomes. Gómez, Lorente, and Cabrera (2004) divided learning capabilities into the following categories: managerial commitment, systems perspective, openness and experimentation, and knowledge transfer. Among these four, we would like to stress the importance of the experimentation capability in making an organization a learning organization. Experimenting might increase creativity and problem-solving capability in an organization. As Barton (1992) argued, experimentation is necessary for increasing independent problem-solving and continuous innovation. McGill and Slocum (1993) also pointed out that an experiment-friendly culture significantly affects the openness and creativity of an organization.

Relatedly, simulation strategies can also make governments to be well prepared for quadruple-loop learning because simulations enable them to enhance their learning capabilities and to make a best possible choice among alternative policy options at low cost (Duzevik, 2017). As a matter of fact, the simulation methodology has already been used widely in predicting how and to what extent epidemics will spread in a limited way (Stevens, 2020). Finally, we also note that future studies need to further investigate how the quadruple-loop learning model can be applied to future government actions until the COVID-19 pandemic stops. We also need to examine how different institutional, cultural, technological, and environmental factors can improve quadruple-loop learning mechanism in different governments. These studies will require more in-depth case studies as well as cross-country and cross-case comparative studies.

## Disclosure statement

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## Notes on contributors

*Sabinne Lee* is an associate research fellow at the Korea Institute of Public Administration (KIPA). Her recent research topics are mainly about the public management, crisis management, technology policy, e-government, environmental policy and incentive theory.

*Changho Hwang* is an assistant professor at the Department of Public Administration of Dong-A University. His research interests include organization theory and governance, public leadership and management, nonprofit organizations, applications of digital technologies, and public policy.

*M. Jae Moon* is dean of College of Social Sciences and director of the Institute for Future Government at Yonsei University. The areas of his research interests include digital government, public sector innovation, comparative public administration, and public policy instruments.

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