

## **Global Universities' Leadership during COVID-19: Synergistic Knowledge Production to Mitigate an Endemic Crisis**

Sowmya Ghosh<sup>a\*</sup> and Linsay A. DeMartino<sup>b</sup>

<sup>a</sup>*University of Arizona, USA*

<sup>b</sup>*Illinois State University, USA*

\*Corresponding author: Email: [sowmyaghosh@email.arizona.edu](mailto:sowmyaghosh@email.arizona.edu)  
Address: University of Arizona, Arizona, USA

### **ABSTRACT**

*The role universities play in advancing COVID-specific knowledge and long-term management of this global crisis is largely unknown. In this comparative perspective study, we document the ways in which members from universities in the US, New Zealand, Italy, South Korea, and China engage in activities to respond to the pandemic. We frame this study with consortium-style emergency management and continuity planning (Friedman et al., 2014; Mann, 2007) and apply the sensemaking knowledge management framework (Choo, 1998) to identify strategies that university members employ to generate new scientific knowledge on COVID-19. Our findings reveal that response to the pandemic varies by university stratification, specifically by size and research capacity. At the time of this study, we identified three distinct lenses by which university members position their leadership and research on COVID. Universities from China utilized a post-pandemic approach. Whereas universities in the US, Italy, New Zealand, and South Korea approach their COVID research activities using an evolving-pandemic anticipatory lens and focus on Synergistic Knowledge Production (SKP) on current and future pandemics by engaging in a range of collaborative and*

*interdisciplinary research activities with members of regional universities. Findings also provide policy implications for university-led responses to global health challenges.*

**Keywords:** *COVID-19, Collaborative research, Interdisciplinary Research, Synergistic knowledge production, Sensemaking*

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## INTRODUCTION

The outbreak of COVID-19 has put the spotlight on medical professionals, engineers, pharmaceutical scientists, public health officials, and researchers to produce new knowledge that mitigates the global pandemic (Reimers, & Schleicher, 2020). After over two years of living with the consequences of the pandemic, it is apparent no one around the globe is spared by the devastation caused by the outbreak, which could become endemic (Phillips, 2021). Our social, health, economic, education and political spheres are forever changed. It is even more apparent that solutions to tackle this public health crisis require a concerted global effort. In other words, as the World Health Organization's (WHO) Director-General stated, "all countries can still change the course of this pandemic...detect, test, treat, isolate, trace, and mobilize their people in the response" (WHO, 2020b). In this study, we argue that global universities are central to generating new scientific knowledge about COVID-19 by engaging in a wide range of collaborative research efforts. We trace the ways by which university leaders make sense of crisis and in the ways they engage with each other to provide novel ways of thinking.

At the onset of the spread of COVID-19, leaders of educational institutions found themselves threatened by sudden disruptions, financial strains, and pressures to radically shift from regular operations and instead provide support to their students by flipping their in-person courses to online delivery methods (Briger, 2020). At the same time, members of universities have rapidly advanced the necessary innovation required to manage and contain COVID-19, such as developing "vaccines, personal protective equipment (PPE) and medical devices" (Wise, 2020). Moreover, global collaborations between universities and leading industry experts (such as biotech firms, policymakers, nonprofits, governmental and private sectors) have facilitated in developing new scientific knowledge about conducting COVID-19 related research by sharing resources, information, and data across the boundaries of organizations. Such global collaborations across fields of study have also led to the formation of interdisciplinary teams of experts to develop ethics and research guidelines that aid in difficult decision making during these unprecedented times (Shaker & Plater, 2020). Given the proactive stance by the WHO, different countries, such as China, Republic of Korea, New Zealand, Italy, and the United States, took divergent paths to prevent the COVID-19 infection rate from rising in their respective countries.

Through this study, we investigate cross-comparatively the various activities that members of universities in China, Republic of Korea, New Zealand, Italy, and the United States engage in to advance our collective scientific knowledge on COVID-19. As a field, we also aim to better understand higher education under an extreme crisis to ascertain what might be learned on how educational institutions may be better equipped to respond to crisis in the future. Framed by crisis-related literature (Barker & Yoder, 2012; Mann, 2007), our analysis is guided by applying and extending the framework of sensemaking (Choo, 2002) and the concept of consortium style management (Mann, 2007). These frameworks allow us to examine the processes and activities that institutions and its members engage in during complex times of crisis to produce knowledge.

Next, the findings from this multi-case study are presented to inform cross-cultural, interdisciplinary, and collaborative strategies that members of institutions around the world engage

in by combining sensemaking processes and knowledge production activities to arrive at decision making capabilities. Using our findings and conceptual frameworks, we coin the term Synergistic Knowledge Production (SKP) (Ghosh, Upcoming) to categorize a wide range of activities that universities engage in to make sense of a time of immense crisis and collect ways in which they inform their decisions. Through our discussion, we explain the range of processes and activities world universities engage in during crises that necessitates new epistemology. Further, we aim to understand the ways university members make sense of existing processes, resources, networks, and knowledge to extend and develop new scientific knowledge that assists in COVID-19 response.

## **LITERATURE REVIEW**

### **Institutions of Higher Education in Crisis**

During times of crisis, colleges and universities face a broad array of evolving institutional challenges. There is a constant imperative to shorten the timeline on effective responses, such as bringing campus facilities back on-track; the successful recruitment of new and returning students; the evaluation of the current and future finances; and the ability to restore campus resources for students and the surrounding community (Mann, 2007). Some of these challenges related to the COVID-19 crisis included the forced transition to remote learning and working; campus-wide safety precautions and protocols; the deployment of advanced mental health support services; the evacuation of campus residences and dormitories; and the procurement of technology, personal protective equipment (PPE), and other sanitation/disinfectant materials. In fact, a failure to provide solutions to these challenges can potentially devastate colleges, universities, and the surrounding community (Kapucu & Van Wart, 2008; Koehn, 2019).

Given the imperative to remedy a crisis on campus, it is important to recognize (as the crisis unfolds) broader themes concerning advanced emergency planning (Barker & Yoder, 2012; Coombs, 2007). These themes might include the viability of campus emergency communication systems, the evaluation processes for moving towards emergency precautions, and the execution capabilities relative to shutting down a campus to transition to remote operations (Mann, 2007). Moving from thematic conceptions to implementing emergency planning and preparedness is yet another hurdle. Time constraints, training limitations, a lack of personnel and resources and budgetary concerns seem to outweigh this emergency planning (Coombs, 2007; Mann, 2007). However, it is imperative for institutions of higher education to initiate this strategic emergency planning because at the core of every campus mission is the safety and well-being of its students, staff, faculty, and surrounding community. Identifying themes that emerge during crisis allows for greater leadership foresight to manage future challenges as well.

### **Consortium-Style Emergency Management and Collaboration on Campuses**

Crises in institutions of higher education bring a unique set of challenges. The vulnerability of the student body is of the greatest risk to the institution and jeopardizes the totality of organization (Barker & Yoder, 2012; Koehn, 2019). Some scholars argue that institutions should adopt a consortium-style emergency management and continuity plan in an effort to protect their students, administrators, faculty, and staff. The consortium-style emergency management style allows for “greater geographic coverage, inclusion of technical coverage and sectoral strengths from multiple organizations” (Friedman et al., 2014, p. 1). In broad terms, this model focuses on creating emergency planning organizations that have a shared mission to support and develop emergency management and campus continuity planning for a cohort of institutions” (Mann, 2007, p. 59). According to Barker and Yoder (2012), the four stages of emergency institutional actions are: (1) emergency planning, (2) emergency response, (3) emergency management, and (4) campus continuity and recovery.

Emergency planning entails the identification of risks and the draft of procedures which serve as an institutional response using a broad-based, consortium-style approach (Barker & Yoder,

2012; Mann, 2007). Along with training and equipment assessments, it is integral for the institution of higher education to coordinate with both internal and external stakeholders in order to prepare a more cohesive emergency responses with increased resources (Barker & Yoder, 2012). As consortium-style emergency management plans are highly collaborative, centralized, and resource-based, diverse stakeholders assist in all areas of the emergency management program (Mann, 2007). Similar to a “brain trust,” participating colleges and universities focus on extensive emergency planning, both monitor and assess these programs, and plan activities going beyond the campus to include community, regional, and global perspectives. This “synergy of collaboration” also produces higher level of accountability and participation in managing response to a common objective (Friedman et al., 2014, p. 21).

The first priority during the emergency response stage is the health and safety of the college or university community (Yoder & Barker, 2012). A significant challenge at this point is timely communication with all stakeholders. Leaders in crisis must also be aware of the language they use to communicate during these challenging times. According to Hutson and Johnson (2016), “when leaders say they are in charge of the situations that we perceive to be out of control, we know we’re being protected or played. Your words matter and your implicit messages matter even more” (p. 19). For leaders, it is important to deliver both clear and consistent messaging to their constituencies in order to reduce the stress and anxiety associated with crisis (DeMartino & Weiser, 2021). As an assessment of campus safety is resolved and/or an evaluation of the impact is conducted, the institution can then plan to move to the emergency management phase.

In the emergency management stage, the focus is on reports, such as health, safety, and facility readiness, and remaining risk assessments (Yoder & Barker, 2012). After collecting these reports, an additional coordinated communication push to all constituencies is necessary. In these communications, an overview of what activities the college is engaged in and in what approximate time frame these plans will launch and be sustained is presented.

Finally, during campus continuity and recovery, the development of both short-term and long-term plans to get operations back up and running (Barker & Yoder, 2012). The goal is to get back to operational and program normalcy in the safest and shortest amount of time. Given the vast amount of resources used for collaborative emergency management planning, colleges and universities benefit greatly from consortium-style management planning.

### **Benefits of Consortium-Style Emergency Management**

The benefits of consortium-style emergency management are well-suited for local, national, and international institutional environments. Universities are encouraged to develop consortiums based on mutual interests. Like so, grouping institutions of higher education into similar categories, expedites consensus when an emergency necessitates swift actions. Then, the shared leadership embedded within the consortium design “engages in the regular development, refinement, and assessment of appropriate protocols crafted to address incidents that have a significant impact on the health, safety, and operations of the consortium colleges” (Mann, 2007, p. 62). These united consortium protocols address continuity planning, such as mission-critical operations, institutional forecasting, and effective communication.

Preplanning is established to move from institutional crisis to normalcy. With this preplanning, the consortium is able to support a distributed and collaborative approach to crisis management by bringing mission-critical operations back online, including utility services, safety, and communication (Mann, 2007; Rocha et al., 2005). At the same time, the consortium leadership team forecasts when the institution can resume both modified and regular operations and collaboratively develops a unified front for both the present and future crises. Through the development of a unified communication strategy, the team practices effective communication to their constituents by eliminating conflicting messaging and redundancy (Mann, 2007). Finally, while individual campuses may build a personal inventory of basic supplies (e.g., emergency

generators), most resources are shared through the consortium through the power of collective capacity, creating an abundance of shared assets for member organizations. Alongside consortium-style emergency planning, institutions of higher education should assess the wellness of their community in times of crisis.

### **A Need for Novel Research During Crises**

Aside from navigating and arranging for critical messaging to manage a crisis, it is equally important for university leaders to respond to societal need by facilitating novel research that fosters unique ways of thinking, scientific knowledge and/or innovation that mitigates the wide range of never-before-experienced, ambiguous challenges such as the COVID-19 pandemic (Dumulescu & Muțiu, 2021). Governments around the world highlighted the need to make COVID-19 response a common public good by pooling knowledge that would result in equitable solutions for recovery from the pandemic (WHO, 2020, UNGA-76, 2021). Similarly, the International Chamber of Commerce also called for the international community to engage in multilateral and multistakeholder cooperation to generate scientific collaboration that is crucial to delivering equitable access to critical medical services, ensuring business continuity and to be better prepared to manage future epidemics (ICC, 2020).

While these unanticipated and urgent calls resulted in an “unprecedented explosion” of scientific research on the pandemic, a recent study from the biomedical field finds that scientific knowledge production may have been mismanaged during COVID-19. Researchers record that there were duplications of clinical trials and a lack of exposure to resources that hindered immediate collaborative research engagement at the institutional level; these conditions resulted in poor quality of research output (Perillat, & Baigrie, 202; Silberner, 2021). These scholars also state that the rapid need to respond through science resulted in wasteful and poorly executed methodological studies leading to immense public disservice. It could be argued that the onus of facilitating collaborative research falls on leaders to first establish and then maintain a research agenda in higher education and infrastructure that stimulates and supports research activities. Facilitating collaborative research should also be an effort initiated by stakeholders from cross-sectors. Through this study, we examine the ways that university leaders respond to a crisis by facilitating scientific research output. As we analyze the range of activities university leaders put forth to expand scientific research on COVID-19, we utilize the theoretical framework of the sensemaking model and apply the consortium-style of emergency management to examine our qualitative data.

## **THEORETICAL FRAMEWORK**

### **Sensemaking and Consortium-Style Emergency Management**

The framework of sensemaking is utilized to better understand the consortium-style emergency management that institutions in this study engage in to preserve their overall well-being. Sensemaking is particularly evident in environments that are undergoing change or “discontinuity in the flow of experience” (Weick, 1995 as in Choo, 2002, p. 80). Weick (1995) further argues that individuals within an organization engage in a reflective process to create plans in anticipation of the future. Choo extends the concept further by adding that sensemaking involves members negotiating their beliefs to reach shared goals and this, he points out, is the “outcome of sensemaking” (Choo, 2002, p. 85). In times of turbulence, like the COVID-19 crisis, Choo’s (2002) findings on environmental scanning are important to include as part of sensemaking. Choo (2001) finds that information seekers engage in environmental “scanning” by using infrastructure of the organization and the resources that it provides. Further, he argues that sensemaking processes are the initial steps that lead to decision-making and knowledge creation (Choo, 2002; 2001; 1996). In this way, we argue that sensemaking enhances the legitimacy of consortium-style emergency management system in order to effectively navigate and facilitate world colleges and universities in

extreme crisis, like the COVID-19 pandemic. In order to present our claim, we present our methodology, including our data collection, sample selection, and analysis.

### RESEARCH METHODOLOGY

Over a thirteen month data collection period, to understand the ways by which universities produce new knowledge about COVID-19, we examined a variety of institutional resources derived from university web pages, such as messages from university top-level administrators and/or country Prime minister/ Presidential decrees, health authority announcements, research- faculty specific web pages, COVID-19 related images, meeting documents, webinars, university research agendas that detail current and future research plans of faculty to increase knowledge on COVID-19, as well as documents that serve as campus guidelines for managing the pandemic. In this study, we apply qualitative thematic text analysis (Kuckartz, 2014) to answer the following research questions:

1. In what ways do universities members commit to producing knowledge about COVID-19?
2. In what ways do university members engage in collaborate efforts to generate new COVID19 related knowledge?

#### Data Collection

Based on where (countries) the pandemic outbreak was first recorded, the authors identified a list of five countries. For instance, given the outbreak began in China, we rationalized that universities in China would have a head start on producing COVID-19 related information. Other countries included in this study are New Zealand, Italy, South Korea, and the United States. These countries were selected based on the rate of the outbreak at the onset of the pandemic and the implications gathered from their projected recovery rate (i.e., How soon/or not they would flatten the curve of COVID-19?). Universities selected from all five countries needed to appear on at least two of the top three ranking lists such as the 2020 TIMES, American Ranking of World Universities (ARWU) and ShangHai JiaoTong (QS) Ranking lists. While we remain critical of rankings and agree with the criticisms of their methodology (See Hazelkorn, 2019), all attempts were taken to include universities of different characteristics from each country. For instance, for each country, we include a variety of universities that have an average rank (taken by calculating the average ranking across the ranking lists) that we then categorize as Tier 1 (top 200), tier 2(201-400) and tier 3 (all institutions 401 and below).

#### Sample Selection

The final sample included a total of 30 global universities in this study (New Zealand (3), Italy (5), South Korea (6), China (6) and the United States (10). Previous studies where world universities were the unit of analysis also informed the sample selection procedure (Lee, Vance, Stensaker & Ghosh, 2020; Stensaker, Lee, Rhoades, Ghosh, Castiello, 2017). Particularly in this study, we began with a large pool of universities and narrowed the sample pool down to include only institutions that had website content revealing the ways by which their leaders were facilitating and engaging in sensemaking activities. The majority of the universities included in this study are described as public or national and only 7 out of the 30 universities are private institutions. A total of fourteen tier 1, nine tier 2 and seven tier 3 ranked institutions were included (see Appendix 1 for full list of institutions). Our country selection was based off the highest rate of media interest at the onset of COVID-19. For example, in addition to collecting institutional-level data, we also relied on global news outlets' reporting of the pandemic. The selected nations at the

start of our study had high infection rates and/or had unique national mandates to mitigate the pandemic. Although the infection rates are still in flux and the national mandates are still in transition, we believe that the snapshot provided by these data reveals nuanced ways of how leaders from various world institutions navigate a time of evolving crisis.

### Analysis

First, we collected text data from all university documents<sup>1</sup> that were available via institutional websites. We systematically sorted out these texts based on authority. For instance, when the texts were authored by the university leadership, we labeled it as such in our database and when messages were from national government officials, we also separated those texts in our database. Upon data collection, each researcher independently identified patterns and processes that were both similar and different across the five countries and 30 institutions. The authors then coded the data based on predetermined themes that were both informed through the literature on crisis management and sensemaking procedures and based on emerging patterns from the textual data. To triangulate our data, we each then inter-coded our data to avoid any researcher biases to the best of our ability.

## RESULTS

We present our findings by applying them to our sensemaking framework coupled with text analysis that reveals the phases in which university leaders are in accordance with a consortium management style framework. Moreover, we provide texts from the websites and other documents collected to trace behaviors, processes, activities, initiatives, and commitments institutional leaders make that lead to knowledge production and navigation at the institutional level during the COVID-19 pandemic.

First, our text analysis reveals a collection of activities ranging from *decision making* (e.g., deciding campus closures, translating courses, the addition of new online platforms, or training staff to navigate an online system due to the impact of the COVID-19 pandemic) to *knowledge-creating* (e.g., encouraging more collaborative research crossing institutional and fields of study boundaries, webinars/dialogs with medical professionals and other STEM field experts from different regions to exchange knowledge on innovative ways to manage the outbreak of COVID-19 and its long term effects).

Within each of these processes, we found that decisions were made collaboratively both within and outside the institutional level, including external members, such as government officials, health experts, and other local authorities. The evidence collected for knowledge-creating within the sensemaking framework revealed leaders' efforts to encourage greater collaboration in terms of experts coming together to exchange knowledge to develop new technologies and/or innovation about COVID-19 and interdisciplinary research knowledge production (where researchers combined knowledge from two or more fields to produce new knowledge). The coming together of both people and fields/domains of study was an overarching finding from our text analysis. Instances of multistakeholder collaborations stemming from geostrategic partnerships resulted in more novel knowledge production activities. Our study revealed that efforts to curb the pandemic needs to be a collaborative global effort that synergizes knowledge from distinct or separate organizations, people and/or fields of study. The newly coined term, Synergistic Knowledge

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<sup>1</sup> University documents include web pages which contained messages from university top level administrator and/or country government officials/ President decree, health authority announcements, research faculty specific web pages, COVID related images, meeting documents, webinars and university research agendas

Production (SKP) (Ghosh, Upcoming) is used to describe this process, wherein we acknowledge both institutions at the organizational level, people within organizations and outside of organizations coming together to produce novel, improved ways of thinking. Included in this term is also the practice of interdisciplinary studies where one (or more) researcher combines knowledge from separate fields/domains of study to develop new knowledge and/or innovation.

When these criteria are satisfied, which was a major finding of our study, we recommend that university leaders are indeed facilitating synergistic methods of knowledge production given that the needs of the current climate cannot be addressed by a single entity/person alone. Given our space, place, and time, it is important to discuss the crucial necessity of building an institutional infrastructure grounded in SKP. That is, intentional collaborative global efforts that synergizes knowledge from distinct or separate organizations, people and/or fields of study. Therefore, we highlight that SKP echo the calls made by the Global Inclusivity Report to increase diversity in academic research for more creativity and inclusive ways of thinking, as well (Global Inclusivity Report, 2020).

We found that synergistic knowledge production decreased down tiers, with tier 1, providing evidence of the highest SKP and tier 3 engaging in lower levels of SKP. Next, we provide text evidence to further understand university leader's sensemaking processes that harness the most out of synergistic knowledge production.

Our text analysis revealed numerous themes (see table1) that map onto the sensemaking framework of decision making and knowledge-creating. Specifically, we found that across all institutions, leaders engaged in decision-making by utilizing knowledge disseminated by government and public health experts, particularly at the onset of the pandemic. During this time, universities also grappled with rapid closures for an uncertain period of time, and text evidence revealed ways institutions were planning to operate moving forward by using the HyFlex model of learning, where their courses would be offered via face-to-face or online at the same time by the same faculty member. However, even though this specific decision was common among all institutions, the reality of implementing a new teaching infrastructure differed by tier. For instance, tier 1 and 2 institutions were well equipped to seamlessly translate courses onto online infrastructures, whereas tier 3 institutions experienced longer periods of disruption before establishing online teaching mechanisms. Tier 1 and 2 institutions also initiated remote learning trainings for faculty who did not have prior experience translating their courses to an online platform. For instance, at the University of Cincinnati, leaders released a video to provide students with guidance on the transition to remote learning and stated "we have planned an approach with a combination of online, hybrid, HyFlex and face-to-face course offerings, along with an adjusted calendar as well as enhanced health and safety measures." Another U.S based institution, Emory University stated that "Graduate and professional programs are being addressed on a case-by-case basis" where online options were provided if the nature of the subject did not necessitate in-person teaching.

Aside from discussions of forming decisions on how and when degree offerings could continue, several universities, particularly those from Asia, revealed the urgent need for more knowledge to be developed about the COVID-19 virus but explicitly expressed that efforts needed to be collaborative, cross-institutional within the country, region, and at the international level. This urgency for greater knowledge production is evidenced by a number of efforts taken by universities. First, we find that to develop more international research collaborations, university members are engaging in cross-institutional dialog (webinars) and research collaborations that are both drawn from multiple disciplines as well as researchers coming together from distinct disciplines to develop new knowledge. Second, universities have dedicated websites to their members' collective efforts in developing and collecting knowledge specifically to mitigate the outbreak of COVID-19.



For instance, in a Korean tier 1 institution’s (Seoul National University) homepage, a dedicated university COVID-19 response website was created to document and track all pandemic related announcements, initiatives, and procedures. This website can now be thought of as a library of pandemic specific information that was generated through several activities, ranging from publications, interdisciplinary dialog (experts from health fields coming together with researchers from different fields of study to develop novel approaches to target and respond to various needs and aspects of the pandemic), and national, regional, and international collaborative research projects that share intel on ways countries are combating the current wave of the pandemic and anticipated waves that could be far more contagious. University leaders (top-tier leaders) relied on their faculty experts and local government to base decisions on fresh knowledge that was being generated through their sensemaking efforts. In one tier 3 institution from China, a scholarship was set up by faculty who are expert respiratory specialists to encourage further research on COVID-related infections. This effort was an extension of their goal to also encourage “the integration and interdisciplinary development involving the relevant disciplines of medicine, science, and engineering as well as the construction of emerging medical education.”

**Table 1**

*Themes*

<b>Decision Making</b>	<b>Knowledge Creating</b>
Government and Public Health Expert guidance	Community Collaborations
FLEX model of learning	Online/Remote learning strategies
	Faculty training
Medical Health and Mental Health support	
Collaborative research on COVID19	

Our data also revealed country level differences in both knowledge creation and decision making processes. South Korean universities, regardless of tier, followed government provided protocols to tackle COVID-19 as a singular commitment through robust university coordination with local, state, and national governments. Our findings align with the UNESCO, 2020 report on South Korea’s efforts to curb the spread of COVID and engage in new knowledge production to spread greater scientifically based evidence about the evolving pandemic. Both China and South Korea shared several similarities in terms of their efforts to generate more research around COVID related knowledge. We find that both countries’ university leaders were at the last phase of consortium style of management where their goals were to plan for the future, in the event of another outbreak. Institutions from China were quick to harness the research capacity of their institutional experts in STEM fields to develop collaborative projects that crossed both university, state, and international boundaries. Interestingly, the language used on website from institutions in China revealed a positive outlook that geared toward a post-pandemic life. In numerous instances,

we saw evidence of institutional websites, regardless of university tier, describing a sense of looking to the future as they have already passed a crisis and a critical health consequential time. For Chinese university leaders, the aftermath of COVID-19 meant taking stock of lessons learned in the medical field by engaging medical professionals with young medical students in discussions to learn not only from them but their counterparts as well. For instance, one such discussion involved medical professionals and scientists from China and Mexico who discussed challenges associated with the lack of medical inventory during peaks of the pandemic. The knowledge generated through such international collaboration allowed medical experts, as well as university leaders, to plan for similar future circumstances.

Similar to China and South Korea, several instances of geostrategic alliances were found to pool knowledge on procedures to move forward from the challenges of the pandemic. Institutional leaders from the United States also expressed a need for greater research collaborations to gather innovation and knowledge about COVID and similar such viral infections. However, one difference was that the majority of the textual analysis revealed that the decision making and knowledge creating processes were dedicated to understanding what the future would look like for institutions and in which ways they could best support students and faculty transition to remote learning under extreme crisis. While research output regarding COVID-19 remains high, our study reveals lesser efforts were taken, regardless of tier, to facilitate and stimulate research collaborations that lead to the development of research on COVID-19. This finding aligns with issues raised by Perillat and Baigrie (2021), as their study reveals duplicate research studies during the pandemic owing to a lack of communication from their institutional leaders. While institutional leaders may have little control over what studies get funded, they can set research agendas that detail strategies to stimulate collaboration between disciplines (i.e: interdisciplinary research) and faculty researchers from all levels of their career. In this study, we find that senior level researcher faculty led initiatives resulted in collaborative research outputs that sought to make sense of challenges faced during the pandemic.

The vast majority of the discussions presented were about the ways by which technology can be leveraged to teach students and stay on track during the pandemic. For instance, one U.S institution's leader stated that "Here you will learn how each school will be operating this fall and find the information you need to prepare; Students living on campus will be put into residential cohorts, ranging from 6 to 12 students.. The emphasis was on procedural decision making to remain in operation during the pandemic. Here we also see traces of "emergency planning" and "emergency response" and lesser of other elements of the consortium management style.

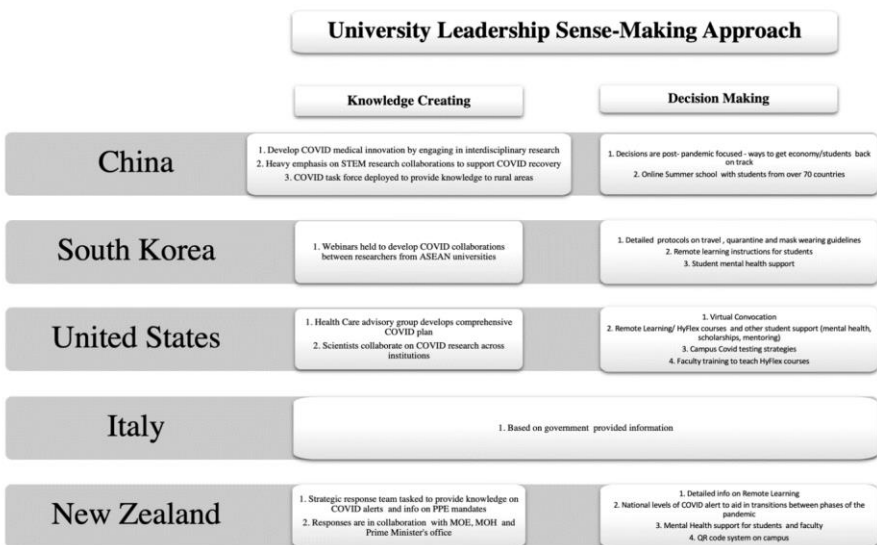
Two nations, New Zealand and Italy were distinct in their approaches to managing the pandemic. Institutions from New Zealand had thorough, nuanced plans for stage 1 and 2 of the consortium style of management. Decisions were disseminated in collaboration with public health experts and the government. They also embraced innovative technology to trace and tackle cluster outbreaks of COVID-19 as they occurred. Text analysis also revealed that institutions from New Zealand differed from others by first educating the public with scientific facts about the outbreak and then mitigating the outcome of COVID-19 using a highly concerted and collaborative country-wide effort to keep everyone on the same page with respect to COVID-19 related information. Their efforts were to focus on controlling the narrative, like nipping misinformation in the bud in favor of spreading medical facts so that all of the citizens would respond positively to top level leadership decisions.

Institutions from Italy differentiated themselves from the rest of the data in many ways. For instance, our analysis reveals that the leaders across institutions from Italy struggled to move past phase 1 of the consortium style of management. Decision making was based on government-provided mandates. Owing to the severely high rate of infection at the time of this research in Italy, we find that their mitigation efforts were limited in scope as there was no discussion of stages 2 and 3 of the consortium style of management wherein they would build mechanisms to combat

future such pandemics. One Italian institution stated that they were “implementing the protective measures issued by the Italian Health Authorities against the COVID-19 [and that a] task force has been set up, composed of scientific experts and prevention office managers” to help manage the crisis. Across all Italian institutions included in this study, none provided evidence of participating in collaborative research efforts that would then lead them into the knowledge creating phase of sensemaking and stages two and three of the consortium style of management that would allow them to better navigate a now endemic virus. Below, we describe the text analysis at the country level in Table. 2.

**Table 2**

*Sensemaking Model*



**Note:** The text data is categorized within the sensemaking model and identifies boundary spanning activities that members of universities across the five countries engage in during the pandemic to produce new COVID-19 focused scientific knowledge

**Limitations**

Despite several efforts to have equal representation across all countries in this study, the criteria of having publicly available data on university websites with respect to COVID-19 leadership decisions meant that we had to remove institutions that had no acknowledgement of ways they would mitigate issues with COVID-19. This resulted in an uneven sample. While we wanted to understand the strategies used by university leaders to engage in more collaborative research especially during a time of global health crisis, our methodology limited us to online materials only. This meant that we were limited in scope should there be more collaborations that were only internally documented. On the other hand, it was also impossible to identify if collaborations actively excluded key experts or stakeholders due to resources that institutions relied

on. In other words, we were unable to identify the influence of politics on institutional decision-making. We also want to acknowledge that every effort was taken to produce a wide range of universities from each country. The sample included in our study is by no means representative of entire countries, but their institutional characteristics were carefully sorted to include a variety of institutional characteristics from each country.

## DISCUSSION AND IMPLICATIONS

This study sought to understand the various processes and activities university leaders undertook during a global crisis to both mitigate immediate challenges and produce solutions for long-term management of grand challenges such as the COVID-19 pandemic. Our study findings highlight how leaders spearheaded new ways of producing knowledge in an increasing complex world given the ramifications of a global crisis. We trace their ways of knowledge production with Choo's (2002; 1996) sensemaking model and find elements of both decision-making and knowledge-creating across all 30 institutions. However, we find that when these processes are mapped onto the consortium style of management (Mann, 2007), each institution varied in phase level of management.

We found stratified differences, wherein institutions within tier 1 were greater poised to manage immediate critical operations, plan for long-term institutional strategies and provide clear communication that adhered to national and global crisis mitigation standards. Further, we find that institutions from China and the United States engaged in the highest amount and range of activities to generate COVID-related knowledge, whether it was procedural or the production of scientific knowledge that allowed better management of the pandemic. We recognize that both nations have historically been documented to have stronger infrastructures in place that allow for swift pivots when it comes to innovation capabilities during a crisis (Porter & Stern, 2001; Mani, 2005; Xiao, Du, & Wu, 2017). However, we found that institutions in China, South Korea and United States had high levels of *Synergistic Knowledge Production* efforts as evidenced by the various activities ranging from internal cross-college dialog between experts in various fields and exchange of knowledge across organization at the regional and national levels. We found that institutions in New Zealand also have high levels of SKP but relied more on internal and regional collaborations, as opposed to international collaborations. The magnitude of the challenges faced by Italy at the time of data collection revealed that their institutional leaders placed the highest dependence on government support and guidance and placed all other elements of SKP as secondary interests. Even though there were varying levels of participation expressed by university leaders at the country level to produce new knowledge to make-sense of the crisis, overall, our study supports that engaging in synergistic means of producing new knowledge remains an urgent method to combat the ongoing challenges associated with COVID-19.

Moreover, because this study introduces the term *Synergistic Knowledge Production*, we argue insular university research activity housed within a singular institution is both outdated and lacks the very innovation and creativity that forward-thinking research demands. Therefore, we emphasize the onus of initiating SKP does not lie with a single member of the university. Instead, in an effort to be proactive rather than reactive as we identified at the onset of the COVID-19 pandemic, we highlight that this type of university research activity needs to become a normative practice across colleges within institutions of higher education and in partnerships created externally, or in sectors outside of the realm of higher education. In other words, for SKP research to take place, its beginnings must also be rooted in the coming together of disciplines, people, organizations and industry experts to produce novel ways of thinking.

Given this key feature of SKP, our study provides a framework for global institutional leaders to consider when it comes to strategic planning and for setting research agendas – wherein a concerted effort in collaboration with multistakeholder experts across boundaries of organizations,

international borders, and fields of study needs to be prioritized to stay abreast of unprecedented global challenges such as COVID-19 and future occurrences of other zoonotic virus transmissions.

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**SOWMYA GHOSH**, PhD, is a legislative policy fellow for Foreign Affairs. Her work focuses on geopolitics and foreign policy by advocating for women’s rights, labor force participation, humanitarian needs, peace and security. Her research interests in higher education highlights world university commitments to advancing scientific interdisciplinary and collaborative research. Dr. Ghosh can be reached at [sowmyaghosh@email.arizona.edu](mailto:sowmyaghosh@email.arizona.edu)

**LINSAY DeMARTINO**, PhD (she/her) is an Assistant Professor in the Department of Educational Administration and Foundations at Illinois State University, USA. Dr. DeMartino’s current research examines transformative practices, collaborative community engagement, and justice in both PreK-12 schools and institutions of higher education. Her email is [lademar@ilstu.edu](mailto:lademar@ilstu.edu).

## Appendix 1

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<b>Region</b>	<b>Country</b>	<b>University</b>	<b>Type</b>	<b>Tier</b>
Asia	South Korea	Seoul National University	Public	1
		Sungkyunkwan University (SKKU)	Private (R)	1
		Korea University	Private (R)	2
		Ulsan National Institute of Science and Technology	Public	3
		Yonsei University	Private (R)	2
		Hanyang University	Private Research	3
		Asia	China	Sun Yat-sen University
Tianjin University	Public	3		
Tsinghua University	Public	1		
Peking University	Public	1		
Shanghai Jiao Tong University	Public	1		
Beijing Normal University	Public	3		
Europe	Italy	Sapienza University Of Rome	Public	2
		University Of Bologna	Public	2
		University of Padua	Public	2
		University of Milan	Public	3

		Sant'Anna School of Advanced Studies – Pisa	Public	1
North America	United States	Case Western Reserve University	Private (R)	1
		University Of Cincinnati	Public	2
		Brown University	Private (R)	1
		University Of Pittsburgh	Public	1
		Emory University	Private (R)	1
		Rutgers, The State University Of New Jersey	Public	2
		Texas A&M University, College Station	Public	1
		Tufts University	Private (R)	1
		University Of Florida	Public	1
		University Of Kentucky	Public	3
Oceania	New Zealand	University of Auckland	Public	1
		University of Canterbury	Public	2
		University of Waikato	Public	3
<hr/>				
Totals	5	30		
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