Journal of Chinese Governance

ISSN: 2381-2346 (Print) 2381-2354 (Online) Journal homepage: https://www.tandfonline.com/loi/rgov20

Striking a balance between science and politics: understanding the risk-based policy-making process during the outbreak of COVID-19 epidemic in China

Peng Liu, Xiao Zhong & Suyang Yu

To cite this article: Peng Liu, Xiao Zhong & Suyang Yu (2020) Striking a balance between science and politics: understanding the risk-based policy-making process during the outbreak of COVID-19 epidemic in China, Journal of Chinese Governance, 5:2, 198-212, DOI: 10.1080/23812346.2020.1745412

To link to this article: https://doi.org/10.1080/23812346.2020.1745412

Published online: 24 Apr 2020.

JOURNAL OF CHINESE GOVERNANCE
2020, VOL. 5, NO. 2, 198–212
https://doi.org/10.1080/23812346.2020.1745412

Taylor & Francis
Taylor & Francis Group

RESEARCH ARTICLE

Striking a balance between science and politics: understanding the risk-based policy-making process during the outbreak of COVID-19 epidemic in China*

Peng Liu[a], Xiao Zhong[a] and Suyang Yu[b]

[a]School of Public Administration and Policy, Renmin University of China, Beijing, China;
[b]School of Public Affairs, Arizona State University, Phoenix, AZ, USA

ABSTRACT

The outbreak of the COVID-19 epidemic in China is, essentially, a public health emergency. Therefore, it becomes a critical issue to make policies by using scientific knowledge in a highly uncertain and unpredictable context. The key issue of risk-based decision-making (RBDM) is how to strike a balance between science and politics. After reviewing existing literature and practice, three main approaches to risk-based decision-making (RBDM) can be summarized: politics-based, science-led, and the integration and negotiation of science and politics. On the basis of public reports from current mass media, this article focuses on the time period from the releasing of the first COVID-19 case in Wuhan to the lockdown policy made by Wuhan municipal government, and we divide important stakeholders in early stage into two groups: scientist group and politician group. It finds that the RBDM process of Wuhan municipal government against COVID-19 demonstrated that politics intertwined tightly with science. Its RBDM process could be categorized into three phases: politics-based, science-involved, and science-led. We conclude six main characteristics of RBDM mechanisms in contemporary China. Finally, we argue that Chinese governments should establish institutionalized mechanisms for the negotiation and cooperation of science and politics in its RBDM process like COVID-19 epidemic. Five policy recommendations have been discussed to improve its RBDM quality in China's context.

ARTICLE HISTORY
Received 4 March 2020
Accepted 6 March 2020

KEYWORDS
COVID-19 epidemic outbreak; science and politics; risk-based decision-making (RBDM); institutionalized negotiation and cooperation; policy suggestions

Introduction

The outbreak of the COVID-19 epidemic in China at the beginning of 2020 is essentially a public health emergency, which falls within the scope of risk governance in the public sector. Risk governance has been applied in many regulation fields such as natural disasters, environmental protection, food and drug safety, and natural resource management.[2] The specific processes of risk governance in the public sector consist of

CONTACT Xiao Zhong ZhongXiaoruc@163.com, zhongxiao@ruc.edu.cn School of Public Administration & Policy, Renmin University of China, No.59 Zhongguancun Street, Haidian, Beijing, China
*Some of the contents were originally published in *Zhili Yanjiu* (Governance Studies), no. 2, 2020.[1]

risk assessment, risk communication, and risk management. We focus on RBDM, which we believe is the most critical component of risk management. RBDM has multiple elements, namely, determining decision-making criteria, establishing the decision-making institutions, evaluating different decision-making resolutions, conducting cost and benefit analysis, assessing related risks and the probability of each resolution, simulating decision-making outcomes, and finally, choosing one resolution as the decision plan. RBDM is different from the routine decision-making process on one hand, since it has a relatively high degree of uncertainty and scientific controversy. On the other hand, it is distinct from emergency decision-making or crisis decision-making, because it requires decision-makers to have a big picture and make decisions based on multiple risk chains rather than give some simple crisis responses.

In the field of public health, risk management has been an essential issue of the World Health Organization's (WHO) global public health policy[3] for many years. RBDM primarily referred to government agencies' decision-making behaviors toward reducing potential adverse impacts caused by environmental hazards on public health, which was a complicated process driven by experts. Later it was expanded as a critical process that combining risk assessment and risk management.[4] RBDM has four components and related questions discussed are as following:

- *Subjects*. Who are the risk-based decision-makers and stakeholders?
- *Principles*. How to deal with the relationship between different stakeholders in the RBDM process? Such as the relationship between different values (e.g. democracy and science)?
- *Process*. When stakeholders conduct a risk assessment in a situation that is highly uncertain and controversial among medical experts, what kind of decision-making institutions, processes, and tools should be established?
- *Links*. How to improve the links between risk-based decision-making and sequential implementation?

Among the above fundamental questions, the critical one is how to do with the relationship between science and politics,[5] which is a particularly important question in public health research field since both values can determine the quality of public health decision-making.[6] Thus, it is necessary to clarify the two basic concepts in our paper: politics and science. Politics here primarily refers to government agencies of different levels. As decision-makers in most risky situations, how to guarantee their decisions will bring enormous benefits for local economic development and social stability, is not only an issue for Chinese governments but also a priority in most counties. Science refers to those experts and scholars who have enough expertise to propose risk assessment suggestions based on their analytic logics and scientific findings. Sometimes, there are conflicting risk evaluations among scientists due to the high degree of uncertainties and hard-to-simulate decision outcomes.

Politicians take a different approach to risk management, in which they take many aspects into consideration, including the attributes of the policy environment, the acceptance of citizens, and the costs of policy implementation. Meanwhile, politicians also will consider their own administrative experience when making decisions. It is

possible that decisions made by politicians may be different or even conflicting with advice offered by scientists. We argue that, in this situation, politicians must interact and negotiate with scientists. In this way, they can maximumly estimate the potential risk factors and consequences in the decision-making process. Specifically, RBDM should not only respect the suggestions and views of scientific community but also ensure that risk management policies can be implemented with less risk and cost. This has been displayed in the local governments' decision-making process of preventing and controlling the spread of the COVID-19 epidemic in China. It deserves a detailed analysis of the interaction and communication process among disease control experts, scientific researchers, and local government officials on how to prevent the risk of the epidemic. Therefore, the questions of interest can be raised as below: While facing challenges imposed by public health risks like COVID-19, how should policy-makers choose between science and politics? Should the decision-making process be guided by politics, or dominated by science, or combined with both of them? Further, how do politicians negotiate and cooperate with scientists in an efficiently organized way? How to improve the quality of RBDM in China's political context?

Politics-based or science-led?

In classic decision-making theories, the decision-making process of policy-makers is undoubtedly a rational process in nature. However, whether it is of full rationality based on classical decision theory, or of bounded rationality following Herbert A. Simon's behavioral decision, or just an incremental process that adhered to Charles. E. Lindblom's muddling-through decision-making theory, a common ground could be found among these perspectives. That is, in a specific policy context, individual rationality is needed for decision-makers to balance different interests among various policy stakeholders and then achieve an acceptable equilibrium. For many scholars, the goal of rational decision-making is either to realize public interest or to obtain the personal goals of policymakers, or just an outcome that multiple stakeholders are competing with each other. Additionally, this decision-making process might be a result that policymakers are pursuing rational goal-setting, or constrained by traditional path dependence, or influenced by other factors such as decision-makers' personal experience. Therefore, from the perspective of policymakers, science, like economic, social, and cultural factors, is just one of many factors contributing to the decision-making process, which has no priority over other considerations. Some scholars doubt the role of science in driving policy-making towards a direction with more rationality. They hold that science may be manipulated by political institutions to support their own political stances.[7] For example, political scientist, Mark Rushefsky pointed out, in policy-making, various interest groups will consciously use scientific uncertainty and knowledge gaps to achieve social goals that meet their interests.[8]

In response to the generalization of scientific factors and related doubts, some scholars take a "politics-based" approach, which emphasizes policy-making must be based on public interest, and science should be applied to defend public values such as social justice and equity. For example, Joel Primack and Frank von Hippel pointed out that, for most scientists, since science and politics cannot be separated entirely,

then why don't we infuse correct public values into science and let science protect the environment and public health rather than be abused? These scholars called for 'Public-interest Science'.[9] Meanwhile, a mixed decision-making model that combined science with politics emerged, that is, the paradigm of science policy. The core of this paradigm is that when there is a disagreement between scientists, or when science itself cannot provide exclusive resolution to relevant risk issues, it should be the political institutions choose among multiple different resolutions according to their legitimate responsibilities.[10]

However, with the rapid development of science and technology, the increasing risks in a global society, and the rise of life politics, the role of science in policy decision-making becomes more significant. The scientific community thus plays a more crucial part in the policy-making process because most policies are made by policymakers' judgment and analysis of scientific knowledge. An obvious sign is that more and more specialized regulatory agencies are established and independent from general administrative institutions. Meanwhile, the establishment of expert advisory committees or decision-making advisory committees becomes a legal requirement for government agencies to make policies. All of these demonstrate that science has penetrated deeply in policy-making, especially in RBDM processes, and the interactions between politics and science also become more frequent. Given this, some scholars propose the concepts of policy science or regulatory science, holding that the interactions between science and politics will help improve the scientific assessment of the safety and efficiency of policy behaviors and providing scientific support for making and implementing risk management policies. They also call for scientists to participate in the process of making policy standards and evaluating policy documents. In this way, both policymakers and scientists can get ample opportunities to negotiate their different opinions and values and bridge the knowledge gap, thus regulatory agencies can get scientific support for their controversial decisions.[11] Moreover, regulatory science can improve the efficiency of scientific evidence in providing information to policies, developing the ability to absorb new evidence and perspectives, enhancing the relevance of research on social challenges, and opening new policy windows.[12] Scientists also try to make a proper distinction between regulatory science and non-scientific intellectual or technical activities to shape a mindset that science can produce more public values.[13]

In terms of those viewpoints, it is imperative to include scientific factors in the process of public policy-making, institutionalize the channels of scientists' participation, and to ensure that scientific advice can be adopted to a great extent by officials. Further, scientific knowledge may facilitate government officials' scientific understanding of situations and avoid arbitrary decisions. Additionally, scholars assume that scientific spirit can advance RBDM to incorporate more scientific supports, which is the so-called "science-led" approach.

The integration and negotiation of science and politics

In the twenty-first century, computers, nanotechnology, biogenetic engineering, information, and cognitive science are changing our daily lives dramatically. However,

technological innovation and inventions may bring us ethical issues and unpredictable disasters if abused. In this regard, it is inappropriate to highlight the role of politics or science in RBDM simply. No matter the "politics-based" approach, or "science-led" approach, the consensus they reach is that politics should interact and negotiate with science to facilitate the policy-making process, especially the quality of RBDM.

Therefore, some scholars have begun to encourage the integration and negotiation of science and politics. For example, David H. Guston proposed using a third-party organization, or the boundary organization, to improve the knowledge exchange and use between scientists and decision-makers.[14] Silvio Funtowicz and Jerome Ravetz argued that when systematic uncertainty and risks are high, RBDM cannot be made just based on known facts but need to be combined with prediction of unknown risks at the same time. Further, except for the scientist group and politician group, various stakeholder groups should also be included in the risk decision-making system.[15] Sheila Jasanoff put forward a trend, which is demarcation and consultation. He argued that since science and politics cannot be simply separated or integrated, the "feasible" direction of science should combine with the "should do" questions of public values.[16] In fact, politicians and scientists have many opportunities to negotiate and coordinate the conflicts and effectively reach a consensus and generate more productive policies. Different from the "politics-based" approach or "science-led" approach, the integrated negotiation approach holds that science and politics cannot be separated. Scholars of this approach are skeptical of the view that science makes political decision-making more rational. In addition, in the practice of integrating science and politics, it is crucial to clarify the nature of the problem, to find out whether it is a problem of science or a problem of politics, and specify to what extent science needs to be integrated with or separated from politics.

Meanwhile, no perfect or "one-size-fits-all" solution could solve all public values problems. Therefore, a satisfying solution should be adopted given the cultural background, economic status, and social structure. Besides, we contend that a transparent decision-making process, citizen participation, and procedures for negotiation, and coordination instead of adversarial procedures are critical for successful RBDM. We expect there is an institutional arrangement that can combine formal citizen participation mechanisms and informal dialogue or debates among politicians, administrators, and experts. Finally, it is indispensable to establish a scientific and comprehensive policy-making system to institutionalize scientists' participation in the policy process, rather than constrain their involvement in the process of supporting policies with scientific evidence. Through setting up specialized expert advisory committees and legitimizing them, we think their independence and authority can be ensured.

Risk-based decision-making logic and limitations in COVID-19 epidemic prevention and control

In the academic observations of Western scholars, China, as a unitary centralized county that is led by Communist Party of China, its public policy decision-making process has gone through several distinct phases. Specifically, it started from totalism[17] to fragmented authoritarianism,[18] and then to consultative authoritarianism[19] of social

participation. There is one commonality of these three phases, that is, in China's decision-making process, scientific factors played a less prominent role than political factors. We argue that compared to the complicated process of China's decision-making, this observation is one-sided and oversimplified. There are many examples can demonstrate that science has been playing a significant role in China's policy decision-making, such as the construction of Three Gorges, regulating genetically modified foods, SARS control, and air pollution governance. Therefore, we think that scientific factors have become increasingly important to Chinese leadership, and COVID-19 crisis management is an example shows the interaction between political and scientific factors in the process of RBDM.

After examining the early stage of the COVID-19 epidemic, we discover that scientific and political factors were interacting with each other in the decision-making process of epidemic control. Based on the public information and related materials we collected, we divide the main decision-making stakeholders related to the epidemic control into two groups. The first is political group, mainly are policymakers, including Wuhan Municipal Party Committee and Government, the Health Commission of Wuhan, and the National Health Commission. This group has a shared attribute: They are all decision-makers at different levels of epidemic prevention and control work that have the power to decide and implement related policies and regulations to realize public interest.scientist group is the second group, and it members are doctors, researchers, and officials that from local hospitals, local Center for Disease Control and Prevention, the National Health Commission, and the National Center for Disease Control and Prevention They are all experts or scientists on the outbreak of COVID-19 that have the expertise to judge and evaluate the epidemic situation and have the power to participate in decision-making and provide advice. In fact, from the discovery of multiple pneumonia cases in December 2019 to the decision of lock down the city announced officially by Wuhan government on January 23, 2020, the decision-making process for epidemic prevention and control was mostly a process that these two groups were interacting and negotiating with each other. Depending on the characteristics identified, we divided this decision-making process into three stages.[20]

The first stage: *politics-based stage*. From the beginning of December 2019 to January 11, 2020. It is essential to point out that the politics-based approach refers to local governments to set up policy goals based on public interest in the RBDM process. Specifically, they considered the impact of RBDM on local social stability and economic development. The epidemic can be traced back to December 1, when the first diagnosed case was hospitalized in Wuhan Jinyintan Hospital. By December 8, a few more cases of pneumonia with unknown etiology (unknown causes) were detected in the South China Seafood Market. By the end of December, the Health Commission of Wuhan reported that while several cases of pneumonia were confirmed to have contacted with the South China Seafood Market, there was 'no evidence of significant human-to-human transmission'. We regard this process as the stage of gradual exposure to the epidemic risk. Since COVID-19 is a new virus, little research has been conducted, therefore, it was reported that human-to-human transmission is still unknown. Although a paper published in *The Lancet* by Huang Chaolin (vice president of Jinyintan Hospital) and others suggested there may be human-to-human

transmissions, but it is hard to conclude due to the small number of cases. Based on clinical experience and professional judgment, the frontline medical workers reported the emergence of the COVID-19 to the Wuhan Center for Disease Control and Prevention (CDCP). CDCP entrusted the patient's sample to the Wuhan Institute of Virology of the Chinese Academy of Sciences for testing. They quickly obtained the entire genome sequence of the virus. At the same time, the virus was successfully isolated.

At this stage, although scientists had only a preliminary understanding of the COVID-19, their speedy reaction and progress have been unanimously recognized by their peers and the international community. However, the insufficient scientific research on the risk of COVID-19 impeded local government officials to develop adequate risk awareness. More importantly, when scientific judgments were not explicit, local governments gave more priorities to maintaining social stability and economic development. Another tipping point is that the first few cases were diagnosed during a policy window period, namely, the local NPC and CPPCC session, which is a politically sensitive period for local governments. Therefore, those who leaked the information in advance to the public were treated as illegally spreading false information. At the same time, the Wuhan Municipal Health Commission also reported the situation to the National Health Commission, and the latter sent the first group of experts to Wuhan to investigate the circumstance. During the early stage of exposure to the epidemic risk, we can conclude that although the local government agencies, represented by the Wuhan Health Commission, were conservative about the uncertain and controversial results, the RBDM was based on politics.

From the beginning of January 2020, more scientist group members were involved. While the first group of experts from the National Health Commission arrived in Wuhan for investigation and testing, the Wuhan Institute of Virology of the Chinese Academy of Sciences and the expert team of Fudan University successfully obtained the entire genome sequence of the virus. This team also successfully isolated the virus and submitted the genetic sequence information to the World Health Organization (WHO). The scientific research progress was rapid. At the same time, the first group of experts announced on January 9 that the pathogen of the case was initially identified as a novel coronavirus (i.e. the COVID-19). A set of relatively strict diagnostic criteria was issued that include contacting the South China Seafood Market, having fever symptoms, and being detected as positive. Only those who meet all three criteria will be regarded as diagnosed cases. Our *ex-post* analysis finds these rigorous criteria did not consider the possibility of human-to-human transmission, which not only created the illusion that the number of patients diagnosed was small but also excluded the potential cases that transmitted from others. Unfortunately, the expert group also considered that the outbreak was 'preventable and controllable' based on the report that there is no infected medical staff in *The Lancet*. We contend that the preliminary risk assessment findings of these experts were consistent with the local government's goal of pursuing social and economic stability. Also, during the local NPC and CPPCC sessions (from January 6 to 10), the local government did not pay enough attention to the epidemic since they believed that the risk of widespread of the epidemic is low.

On January 11, the Wuhan Municipal Health Commission stated again that 'there was no affected medical staff and no clear evidence of human-to-human transmission'.

The second stage: *science-involved stage*. From January 12 to January 19, 2020, the local government got more information about the COVID-19 than in the first stage. This is because more scientific research was conducted, and the National Health Commission also sent a second group of experts to Wuhan to command the epidemic prevention work. From the perspective of science, the cognitive certainty of the epidemic situation had been enhanced, but still in a fuzzy stage that the knowns were not more than the unknowns. Specifically, people began to realize that there may be a human-to-human transmission of the virus to some extent, but the path and scale of it were still unclear. Further, the previous diagnostic criteria were also relaxed, which led to a sharp increase in the number of confirmed cases. This is particularly important for the local governments because they realized their judgment of the epidemic situation was too optimistic, especially when they found that on January 13th and 16th, new cases were even confirmed in Thailand, Japan, and other foreign countries.

However, as this period coincided with the local NPC and CPPCC sessions of Hubei Province, socioeconomic stability remained a priority for the local government's decision-making. Besides, the scientific community had not achieved conclusions about the scope and speed of human-to-human transmission of the virus. After balancing these two forces of scientific researches and political factors, the Wuhan Municipal Health Commission issued the 'Q & A on Pneumonia Epidemic of COVID-19 Infection' on January 15th. Although it continued to emphasize that 'there is no clear evidence of human-to-human transmission,' but they did not reject 'the possibility of limited human-to-human transmission,' and asserted 'the risk of continuous human-to-human transmission is low'. Simultaneously, for the first time, the local government disclosed that there is a confirmed case that has never been exposed to or contacted with South China Seafood Market. Due to this vague risk judgment, the Wuhan Municipal Government did not defer or cancel the 'Ten-Thousand Family Reunion Banquet' held by the Baibuting neighborhood on January 18. Moreover, the local government did not send an early warning on the scope and speed of human-to-human transmission of the virus to the public. On the same day, the Wuhan Municipal Health Commission began to notify the number of cases. Local government actions show the interaction and balance of scientific factors and political factors. Compared with the first stage, we find the role of scientific factors in the decision-making process of local government epidemic prevention and control has gradually increased, while the political factors were weakened to some extent.

The third stage: *science-led stage*. This stage varies from January 20 to January 23, 2020. January 20 was proved as a turning point in the epidemic in Wuhan. After Zhong Nanshan, a well-recognized expert in China, was sent by the National Health Commission to Wuhan to investigate the situation, he confirmed the human-to-human transmission of the COVID-19 on the 19th. Soon afterward, the Wuhan Municipal Health Commission updated the data on the 18th and 19th at one time and declared that a total of 136 newly diagnosed cases was added. However, for the first time, the local government did not mention that 'there is no exclusion of limited human-to-

human transmission' or that 'the risk of continuous human-to-human transmission is low.' We regard this as evidence that scientific factors get involved more profoundly in COVID-19. After the human-to-human transmission was confirmed, scientific factors push local governments to realize that preventing and controlling the epidemic situation and securing public health should be the first public value issue. In this situation, for local governments, maintaining economic development and social stability should give way for epidemic prevention and control work. More importantly, for the first time, President Xi gave instructions on the pneumonia epidemic of COVID-19 infection. Meanwhile, the State Council filed the COVID-19 as a Class B infectious disease, and prevention and control measures of class A infectious diseases were adopted. The actions taken by central governments pressure local governments to make epidemic prevention and control a priority. At the same time, more discretion was also assigned to local governments. Wuhan government took various measures to prevent and control the spread of COVID-19, such as the remarkable policy of lock down the city. This process shows that scientific certainty was increasingly influential in shaping local government officials' risk perception and was incorporated more into the prevention and control work.

After reviewing the decision-making process, we find that the interactions between the scientist group and the politician group are almost clearly at the center of decision-making on epidemic prevention and control. Although political factors are still dominant, the impact of scientific factors is rising. During this process, scientific factors are distinct from, imbalanced with, but yet interdependent with political factors. We also find a hybrid management framework that emphasizes the negotiation and cooperation of science and politics also works in this situation, but this outcome is more out of pushed by reality. This framework, proposed by western scholars, is consisting of four strategies (Hybridization, Deconstruction, Boundary work, Cross-domain orchestration).[21] Further, we did not see an institutionalized mechanism established for the negotiation and cooperation between science and politics using this integrative framework. Combining the attributes of the relationship between science and politics in the decision-making process, we summarize six characteristics of the RBDM mechanisms in China reflected in the COVID-19 epidemic outbreak.

Firstly, the domination of politics-based principle is prevalent in China's policy-making process. The national governance regime is characterized by centralization and unionism for many years, therefore, pursuing social stability and economic development based on public social interests is typically the ultimate goal of the politician group in the decision-making process. This goal is also consistent with public demands, no matter it is decisions made in risk or a normal situation. In the epidemic decision-making process, we discover that local governments have consistently made efforts to implement policies based on public values. It is also like this even in the RBDM process despite considerable uncertainty.

Secondly, the degree of the scientist group's opinions adopted by the politician group depends on how science can explain the uncertainties of risks in the decision-making process. The goal of scientific research is to discover the regularities and causalities of unknown phenomena. And it is a long process to recognize the uncertainties of unknown risk, although we know the overall trend is optimistic. In this process,

when the risk perception of the scientist group is unclear, the politician group can selectively absorb the views of the scientist group based on their value orders. For example, the diagnosis standards are not consistent from the early stage of CONVID-19 prevention and control to the later stage. This is because, at the first stage, scientists did not get much information about CONVID-19. Therefore, they cannot provide aplenty advice to politicians. When scientific knowledge is not enough to reveal the risk reality, persuading politicians to change their priority will be difficult. Unfortunately, this may make politicians overlook the severity of CONVID-19 when it spread.

Thirdly, the effectiveness of scientists' participation in the decision-making process depends on how much they can influence the policies. Scientists are different in their expertise, which may lead them to have different views of the same risk situation. However, this kind of difference also will determine how much they can affect policy-making. We find that, in the decision-making process of the epidemic, frontline medical workers, local researchers in Wuhan, and researchers from the National Centers for Disease Control and Prevention all tried to influence the decision-making of the politician group. Eventually, the primary influence on the decision-making process was from the expert group sent by the National Health Commission, represented by Zhong Nanshan. These expert group members are well recognized by the public, productive in their fields, and have more connections with decision-making institutions. Therefore, it is not surprising that they are the central group that can influence policy-making greatly.

Fourthly, it is imperative to improve the independence and internal diversity of the scientist group. Scientific findings should be independent somewhat from risk assessment. That is, scientists should treat conducting research and get the conclusions as the end rather than affected by other socioeconomic factors. Also, unlike general decision-making, RBDM is often highly controversial in the risk assessment process, which in turn will benefit politicians to make better decisions. This is because it is always better to have different voices to be heard before the final decision is made. However, through our analysis, we find during the RBDM process of CONVID-19, scientists were not so independent on some key issues, such as whether 'human-to-human transmission' is correct how the standards of the diagnosed case should be made. We believe scientists' findings are somewhat infused with socioeconomic factors in the early stage. Further, at a specific scene, we can only hear the same voice from scientists, which is so easy for politicians to think an agreement was achieved among all scientists.

Fifthly, the over-centralized power distribution structure inside the politician group cannot meet the demands of risk decision-making. The formation and spread of risk chains often are so fast, particularly the spread of risks such as acute infectious diseases. However, according to the Law of the People's Republic of China on Prevention, central government agencies have more power in the RBDM process. Local governments that are close to the risk center of the epidemic often do not have enough power to respond timely. For example, when local governments exercise power entitled by the Emergency Response Law of the People's Republic of China (such as initiating emergency plans, issuing early warning, etc.) and reporting the

confirmed cases to central government agencies, they have to wait before they get confirmation and delegated power from the latter to take actions. This kind of unnecessary waiting time and inefficient communication between local and central governments also made local government cannot respond to risks effectively.

Finally, the level of transparency and institutionalization of the interaction between the scientist group and politician group needs to be improved. We believe that during the decision-making process of this epidemic, the scientist group and politician group have interacted and exchanged their ideas many times. However, from the existing materials, what did they disagree with and exchange during the RBDM process? Any evidence for that? And how did they achieve agreements? These questions cannot be answered thoroughly because related information is not transparent. Moreover, there are no institutionalized mechanisms for scientists to participate in the policy-making continuously. This point is demonstrated when we find no matter experts of whatever level agencies or expert groups from the National Health, their participation in the decision-making of epidemic prevention and control in Wuhan is temporary and problem-oriented.

Conclusions and policy suggestions

From the perspective of the development process of RBDM theory and practice, a purely politics-based approach or science-led approach has been proved that cannot meet the increasingly complex requirements of RBDM. For future RBDM, negotiation and cooperation between science and politics will be a trend. However, as seen with China's unique decision-making environment, the decision-making process of the COVID-19 epidemic outbreak revealed that there are still several problems and constraints on the RBDM mechanism in balancing the relationship between science and politics. In the future, whatever situations RBDM face in China, such as the COVID-19 epidemic outbreak, it will be necessary to establish an institutionalized mechanism for the negotiation and cooperation of science and politics, to improve the capability and quality of RBDM effectively. To this end, we think the following suggestions may be useful for political institutions in the future:

Firstly, it is necessary to establish a standardized mechanism for the scientist group to participate in risk decision-making is necessary. To ensure the quality of the decision-making system, it is crucial to institutionalizing the participation of scientists in the fundamental policy-making process rather than just let them provide scientific support. We think this could be realized through taking the following measures: (1) establishing some permanent and specialized institutions such as an expert advisory committee and a pool of experts with different expertise; (2) refining the division of work among all experts based on their expertise and policy areas; (3) maintaining the diversity of experts in different policy areas, work division, and research fields; (4) legitimizing the independence and authority status of these institutions; and (5) increasing the power of expert advisory committee and changing their participation in policy-making process from symbolic to substantive. However, it is indispensable for all experts to claim potential interest conflict. In the context of this COVID-19 epidemic, the experts here do not only refer to the scientists engaged in research but also

include frontline medical and clinical experts. However, it is regrettable that the voice of the latter group was ignored in the RBDM during this COVID-19 epidemic outbreak.

Secondly, it is crucial to enhance the relative independence of scientist group organizations and give them more power to participate in formal decision-making. In some significant areas that need RBDM, legislation can not only empower the scientist group organizations and make them have a substantial impact on the RBDM of politician groups instead of remaining as a procedure. It also allows scientists to have relative independence when making recommendations. Further, legislation should entitle scientists with some liability exemption rights, which can encourage them to be able to put forward their risk assessment recommendations with relative independence. For example, in the RBDM of public health, it is crucial to improve the capacity and power in the decision-making of some specialized public health institutions such as the Center for Disease Control and Prevention (CDC), rather than retain them at the level of conducting scientific research.

Thirdly, when scientist groups have divergences in risk assessment, politician groups should adopt precautionary principles primarily to make decisions. The uncertainty of unknown risks may lead scientists to have different understandings and judgments that require politicians to be cautious when they adopt disputable scientific advice. We think politicians should take the precautionary principle to make decisions instead of applying the majority rule. Specifically, when the risks are not predictable, politicians should relax their decision-making standards for risk prevention and control from the "scientific causality" to "scientific evidence- related." It will help politicians take action during RBDM when there is no sufficient causality analysis, but relevant scientific evidence is available. After all, during risk situations, doing something is better than doing nothing. This is perhaps the best choice to balance science and politics in risk situations.

Fourthly, more attention should be paid to build a more flexible and decentralized RBDM system within the politician group. RBDM has higher requirements for timeliness and flexibility. Therefore, based on the centralized and unified leadership of the central government, it can further empower local governments through authorization and delegation. For risk assessment, local governments can adopt prevention and control policies that based on the precautionary principle, make a checklist of authorities and responsibilities of different levels of governments in RBDM, improve the distribution of the remaining decision-making powers, and further improve the direct reporting management system for infectious diseases. These measures will enable local governments to exercise their power fully, make decisions, and take actions within a specific range as soon as possible. In that case, they can enhance the flexibility and efficiency of RBDM and its implementation.

Finally, public participation and risk communication should be taken more seriously so that RBDM's transparency can be improved. Risk communication means to define, disclose, transmit, publicize, clarify risks so that scientific knowledge can be conveyed to the public. The ultimate purpose of risk communication is to enable various stakeholders to reach a consensus on the severity and distribution of risks so that transaction and communication costs in risk response can be reduced. The process of risk decision-making should be more open and transparent to the scientist group,

politician group, and the public. Local governments must disclose to the public the evidence for their choices they made in their risk management and decision-making practices. During this epidemic outbreak, the local policy-maker needs to explain to the public why such a demanding policy option like "the lockdown of the city" has to be adopted and for what reason other possible options cannot work effectively. As long as this policy clarification based on risk communication principle is arranged, effective implementation of risk management policy in the next round can be guaranteed.

Notes

1. Liu, "Striking a Balance Between Science and Politics," 51–58.
2. We have discussed this view, which is consistent with the findings of some authors, such as Renn, *Risk Governance,* 13–19.
3. World Health Organization. "The World Health Report 2002." https://apps.who.int/iris/handle/10665/42510.
4. We have discussed this view, which is consistent with the findings of some authors, such as Sexton, "Evolution of Public Participation in the Assessment and Management of Environmental Health Risks."
5. We have discussed this view, which is consistent with the findings of some authors, such as Haller and Gerrie. "The Role of Science in Public Policy," 139–165; Demortain, *The Science of Bureaucracy*, 1–5.
6. This view is consistent with the finding of Gostin, "Language, Science and Politics," 541–542.
7. We have discussed this view, which is consistent with the findings of some authors, such as Jasanoff, *The Fifth Branch*, 2–15.
8. This view is consistent with the finding of Rushefsky, *Making Cancer Policy,* 119.
9. We have discussed this view, which is consistent with the findings of some authors, such as Primack and Hippel, *Advice and Dissent*.
10. See note 6 above, 49–57.
11. Ibid., 121–122.
12. We have discussed this view, which is consistent with the findings of some authors, such as Bednarek et al., "Boundary Spanning at the Science–Policy Interface," 1175–1183.
13. This view is consistent with the finding of Gieryn, "Boundary-Work and the Demarcation of Science." 781–795.
14. This view is consistent with the finding of Guston, "Boundary Organizations in Environmental Policy and Science," 399–408.
15. We have discussed this view, which is consistent with the findings of some authors, such as Funtowicz and Ravetz. 219–230.
16. We have discussed this view, which is consistent with the findings of some authors, such as Jasanoff, "Technologies of Humility," 370–389.
17. This view is consistent with the finding of Zou Dang, *Chinese Politics in the 20th Century*, 69. (Chinese)
18. This view is consistent with the finding of Lieberthal and Lampton, *Bureaucracy, Politics and Decision-making*, 2–4.
19. We have discussed this view, which is consistent with the findings of some authors, such as Truex, "Consultative Authoritarianism and Its Limits," 329–361.
20. Review of the epidemic decision-making process in this paper main reference: CCTV: "Dong Qian's interview with the mayor of Wuhan", CCTV News face-to-face, January 27, 2020; Han Ting: "20 days from the arrival of the expert groups to explore the 'mystery' of the COVID-19 epidemic in Wuhan of 'lock down the city' "Economic Observer". https://baijiahao.baidu.com/s?id=1657882105958749600&wfr=spider&for=pc; Chen Rui and Xu

Bingqing, "If the alarm bell in Wuhan has a chance to ring, which day can it be", "First Financial" https://finance.sina.cn/china/gncj/2020-02-08/detail-iimxxste9759371.d.html?ivk_sa=1023197a (Chinese).

21. This view can be found in the finding of Miller, "Hybrid Management," 478–500.

Acknowledgments

The authors would like to thank Professor Jianxing Yu for his encouragement and suggestion on this research.

Disclosure statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

Funding

This research is supported by Major Program of Social Science Foundation of China [Project No.18ZDA112] and the Fundamental Research Funds for the Central Universities and the Research Funds of Renmin University of China [19XNL008].

Notes on contributors

Peng Liu is professor at the School of Public Administration and Policy, Renmin University of China. He obtained his Ph.D. at the Chinese University of Hong Kong. He served as consulting experts in China former Food and Drug Administration (CFDA), and China National Drug Policy, National Health and Family Planning Commission. He was also a committee member in China Society for Drug Regulation. His research interests focus on risk governance and government regulation, particularly, food safety and drug regulation and governance in China. He has published in *Regulation & Governance, China: An International Journal*, *Journal of Contemporary China*, and *Food Policy*.

Xiao Zhong is a Ph.D. candidate at the School of Public Administration and Policy, Renmin University of China. Her research interest mainly focuses on regulatory science and policy-making, comparative regulatory innovations in China.

Suyang Yu is a doctoral student at the School of Public Affairs, Arizona State University, in the United States. Her research areas include environmental management, organization theory and behavior, and public management.

References

Bednarek, A. T., C. Wyborn, C. Cvitanovic, R. Meyer, R. M. Colvin, P. F. E. Addison, S. L. Close, et al. "Boundary Spanning at the Science–Policy Interface: The Practitioners' Perspectives." *Sustainability Science* 13, no. 4 (2018): 1175–1183. doi:10.1080/23812346.2019.1673998.

Demortain, David. *The Science of Bureaucracy: Risk Decision Making and the US Environmental Protection Agency*. Cambridge, MA: MIT Press, 2020.

Funtowicz, S., and J. Ravetz. "Ciência Pós-Normal e Comunidades Ampliadas de Pares Face Aos Desafios Ambientais." *História, Ciências, Saúde-Manguinhos* 4, no. 2 (1997): 219–230. doi:10.1590/S0104-59701997000200002.

Gieryn, Thomas F. "Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists." *American Sociological Review* 48, no. 6 (1983): 781–795. doi:10.2307/2095325.

Gostin, Lawrence O. "Language, Science, and Politics: The Politicization of Public Health." *JAMA* 319, no. 6 (2018): 541–542. doi:10.1001/jama.2017.21763.

Guston, David H. "Boundary Organizations in Environmental Policy and Science: An Introduction." *Science, Technology, & Human Values* 26 (2001): 399–408. doi:10.1177/2F0162243901000401.

Haller, Stephen F., and James Gerrie. "The Role of Science in Public Policy: Higher Reason, or Reason for Hire?" *Journal of Agricultural and Environmental Ethics* 20, no. 2 (2007): 139–165. doi:10.1007/s10806-006-9027-4.

Jasanoff, S. "Technologies of Humility: Citizen Participation in Governing Science." In *Wozu Experten? VS Verlag Für Sozialwissenschaften*, 370–389, Berlin, Germany: Springer, 2005.

Jasanoff, S. *The Fifth Branch: Science Advisers as Policymakers*. Cambridge, MA: Harvard University Press, 2009.

Liang, QiMing, LiZhen Sun, LuFa Zhang, Wei Cai, GuoQiang Chen, JianQing Ding, et al. "An Interim Review of Lessons from the Novel Coronavirus (SARS-CoV-2) Outbreak in China." *SCIENTIA SINICA Vitae* 50, no. 3 (2020): 247–257. doi:10.1360/SSV-2020-0044.

Lieberthal, K., and D. Lampton. *Bureaucracy, Politics and Decision-Making in Post-Mao, China*. California: University of California Press, 1988.

Liu, Peng. "Striking a Balance Between Science and Politics: Understanding the Risk-based Policy-making Process During the Outbreak of COVID-19 Epidemic in China." *Zhili Yanjiu* (Governance Studies) 36, no. 02 (2020): 51–58. (Chinese)

Miller, C. "Hybrid Management: Boundary Organizations, Science Policy, and Environmental Governance in the Climate Regime." *Science, Technology, & Human Values* 26, no. 4 (2001): 478–500. doi:10.1177/2F016224390102600405.

Primack, J. R., and F. V. Hippel. *Advice and Dissent: Scientists in the Political Arena*. New York (NY): Basic Books, 1974.

Renn, Ortwin. *Risk Governance: Coping with Uncertainty in a Complex World*. London: Earthscan, 2008.

Rui, Chen, and Xu Bingqing. "If the Alarm Bell in Wuhan has a Chance to Ring, Which day can it be", First Financial. https://finance.sina.cn/china/gncj/2020-02-08/detail-iimxxste9759371.d.html?ivk_sa=1023197a. (Chinese)

Rushefsky, M. E. *Making Cancer Policy*. New York: SUNY Press, 1986.

Sexton, K. "Evolution of Public Participation in the Assessment and Management of Environmental Health Risks: A Brief History of Developments in the United States." *Journal of Public Health Research* 2, no. 2 (2013): 18. doi:10.4081/jphr.2013.e18.

Truex, R. "Consultative Authoritarianism and Its Limits." *Comparative Political Studies* 50, no. 3 (2017): 329–361. doi:10.1177/2F0010414014534196.

World Health Organization. "The World Health Report 2002 - Reducing Risks, Promoting Healthy Life, World Health Organization." 2002. https://apps.who.int/iris/handle/10665/42510.

Zou, Dang. *Chinese Politics in the 20th Century: From the Perspectives of Macro History and Micro Action*. Hong Kong: Oxford University Press, 1994. (Chinese)