

CHINA PERSPECTIVES SERIES

Scientists' Impact on Decision-making

A Case Study of the China Hi-Tech
Research and Development Program

Peng Ru



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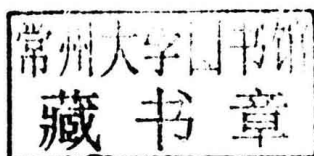
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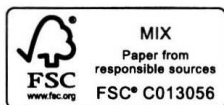
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Scientists' Impact on Decision-making

With the increasing influence of science and technology (S&T) on socioeconomic life and public affairs, there has been a growing demand for S&T expertise in today's public decision-making.

The National High Technology Research and Development Program (863 Program), involving hundreds of S&T experts, marked the beginning of a new journey for China's hi-tech development. This book discusses China's S&T decision-making mechanism, with the 863 Program as the central case and scientists' influence on public decision-making as the focus. More importantly, it extracts three key elements to analyze the determinative factors behind that influence – knowledge, value and institutions, and proposed a KIV framework of macro-analysis. The KIV, being the first framework to generalize factors that could affect scientists' influence on public decision-making, is of both theoretical significance and innovative value. In addition, by finding out those factors, this book attempts to create a decision-making environment conducive to scientists' contribution of their knowledge.

Peng Ru is currently an associate professor in School of Public Policy and Management, Tsinghua University. His research interests and publications focus on science and technology policy, new energy policy and policy process.

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Preface

The end of WWII in 1945 marked the beginning of a period of peace and development for human society. Since then, there has been a rapid and incessant succession of major inventions based on scientific principles, such as the computer and the chip, which are generally referred to as high technology. It has been found that such hi-tech innovations are quick to translate into mass-produced commodities with immediate benefit for society. This has changed our mode of production and our way of life, work and thinking. It has started a wave of new technological revolution around the world, and made innovation an impetus for social progress.

Under such circumstances, public decision-making in a country or a region not only requires knowledge in political, economic and social spheres, but also – and more and more strongly – scientific/technological expertise and wisdom. As a result, scientists, engineering technologists and technological management experts with an insight into the trend and pattern of technological development, the scientific spirit of being precise and realistic, farsightedness and macro-thinking capability, have been involved in policy-making processes in an extensive and profound way. As a crucial part of the nucleus of public decision-making, they have provided decision makers with advisory opinions and technological justifications. Good results have been achieved in many developed countries where scientists are invited to play a role in public decision-making.

Since the founding of the People's Republic of China (PRC) in 1949, scientists, technologists and experts in all fields have gained access to the making of major decisions with a bearing on social and economic development. For instance, they have played a prominent role in such crucial decisions as the “two bombs and one satellite” (the atom bomb, the hydrogen bomb, and the man-made satellite), the Three Gorges Dam, the Qinghai-Tibet Railway, and the South-to-North Water Diversion Project. Their advice and suggestions have significantly enhanced the scientificity of decision-making. Scientists and technologists play an even more outstanding role in decisions on science and technology policies. For instance, in as early as 1956, over 600 scientists, technologists and technological management experts participated in the drafting of the PRC's first plan on scientific and technological development (Long-Term Plan for Scientific and Technological Development 1956–1967). In 2003, when the state launched strategic research for a plan for mid- and long-term scientific and technological development and the

drafting of the plan's outline, over 2,000 experts of natural science, social science and engineering as well as those from the business community took an active part in it by offering their advice and suggestions. In this way they have made a great contribution to the making of China's strategy for the new century – the building of an innovation-oriented country in which development is led by innovation.

The 863 Program, which is regarded as a pioneer of hi-tech development in China, offers a successful example of the crucial role played by technologists in our country's major strategic decisions. In March 1986, in view of the development of high tech around the world, four scientists (Wang Daheng, Wang Gangchang, Yang Jiachi and Chen Fangyun) wrote a letter to Deng Xiaoping calling for the launch of a Chinese program for hi-tech research and development. Upon receiving the letter, Deng wrote an instruction, "Make a decision on this without delay." In November 1986, the National High-tech R&D Program (i.e. the 863 Program), the making of which involved hundreds of experts, was ratified by the Communist Party of China (CPC) Central Committee and the State Council, which marked the beginning of a new journey for China's hi-tech development. The four scientists' outstanding contribution in decision-making consultation will go down in history forever.

Thanks to extensive practice in the past 25 years, the 863 Program has drawn worldwide attention to its achievements and accumulated a great deal of experience in how to organize and carry out major technological plans. To give full play to the role of scientists in decision-making, implementation and management have always been an important feature of the decision-making management mechanism of the Program. Carefully selected from around the country, the outstanding scientists, in the "863 spirit" of "justice, innovation, truth-seeking, cooperation and dedication", have played a vital role in decision-making consultation on the macro-management level (implementation strategy, field configuration and the allocation of resources) and the execution level (division of research projects, project management and final inspection). They have made a great contribution to the smooth implementation of the Program and the hi-tech boom in China by ensuring that planning and decision-making are scientific and democratic. From another perspective, the past 25 years' precious experience in organizing and carrying out major technological programs with Chinese characteristics is worth sorting out and summing up in a systematic way.

I am pleased to see that Dr. Peng Ru, in this book written under the guidance of his supervisor Prof. Su Jun, has conducted systematic empirical research and profound theoretical discussions on the major theoretical and realistic issue of scientists' participation in mechanism and system of the state's public decision-making and achieved valuable results.

Starting from the determinative factors and formative mechanism for scientists' influence on science and technology decision-making in China, the author has developed a theoretical model (based on theories about policy science, technology and society, and the application of knowledge) to explain the influence of the actors in such decision-making processes and put forward a number of scientific propositions. This indicates his originality in the grasping of theoretical cutting

edge and the observation of practical issues. With the 863 Program as the central case, he has conducted many in-depth interviews with dozens of people with personal experience of decision-making management in the Program and collected a great deal of precious historical data. His vivid description of the development of the Program's decision-making management mechanism has provided important reference for the study of the evolution of decision-making in China's technological programs.

I was greatly honored to have participated in the feasibility study of the 863 Program, and I still vividly remember how excited it made me feel. I had never expected that I would serve the Program another unforgettable six years for its early implementation management. Since then, I have always been involved in the Program in terms of management consultation and strategic studies. I am very glad to see the publication of this academic work that discusses China's S&T (science and technology) decision-making mechanism from the perspective of the 863 Program. I fervently hope that its readers would probe into the scientific, democratic and procedural aspects of decision-making management for the Program from the perspective of development and innovation. In this era of global innovation, fast changes are taking place in hi-tech competition. To keep abreast of the times, any nation must reform its management of hi-tech decision-making. A good decision should be technically feasible, economically reasonable, legally permissible, executively controllable and politically acceptable to all parties involved, with achievable results and a sensible balance between overall benefits and general costs. This calls for scientific decision-making through incessant incorporation of scientific knowledge and opinions and the active application of scientific methods and procedures, and democratic decision-making through listening to opinions of the people and the parties concerned in order to know what they think and pool their wisdom.

Hail to the experts and scholars who have turned the achievements and experience of the 863 Program to good account for society!

Ma Junru
Member of the Expert Consultant
Team of the 863 Program
Former Director General of the
State Administration of
Foreign Experts Affairs

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1 Introduction

1.1 Background

1.1.1 Scientists' policy participation: practical significance and theoretical value

Since the end of WWII, with the increasing influence of science and technology (S&T) on socioeconomic life and the increase of S&T factors in public affairs, there has been a growing demand for expertise in today's public decision-making. Since the expertise involved in such decision-making is way beyond the knowledge of decision makers, scientists have gained wide and profound access into policy processes owing to their superiority in knowledge. They have become important actors in public decision-making processes, which have consequently been more and more strongly characterized by being as scientific they are political (Golden, 1991).

Owing to the long-term practice of planned economy after the founding of the PRC, the government became the matter-of-course leader of public decision-making. Under such circumstances, if the government failed to pay effective heed to professional opinions from the academia when making decisions, it was likely to make misjudgments on scientific issues, which might lead to terribly wrong decisions. Since the advent of the reform and opening up, the Communist Party of China (CPC) and the Chinese government have come to a deep understanding of the necessity of science and democracy in decision-making. As a result, they have listed it as a major task in political reform¹ and reiterated many times the need to create a democratic and scientific decision-making system.² In practice, the government has placed more and more stress on the important role of experts and expertise in the making of policies and intensified interaction and cooperation with the S&T community. The remarkable increase of scientists' participation in and influence on public decision-making has made the government's decision-making much more scientific. A typical example is the letter written by Wang Daheng and three other scientists to Deng Xiaoping in 1986, which led to the creation of the 863 Program and marked the beginning of China's new journey of high technology. However, under the influence of our lasting cultural and political tradition, the progress toward scientific and democratic public decision-making

has been slow. The government still has absolute control over decisions involving a great deal of expertise and public interests, with little participation by experts and the public. This has incurred questions and criticism from the scientific community and the public. Some scholars have called for giving top priority to more scientific and democratic decision-making in the current effort to promote political reform and accelerate the building of socialist democracy (Chen Zhenming *et al.*, 2007). In this sense, to discuss how to improve the public decision-making process in China and make it more scientific and democratic so that the policy outcomes are more compatible with the interests of the state, society and the public is of profound practical significance and a subject deserving painstaking research by theorists.

During a public decision-making process, the more influential participants will make the policy outcome more in line with their own interests and values so as to obtain maximum benefit. Naturally, who can exert more influence on others and thereby dominate the decision-making process, which factors determine the participants' influence, and what causes the wax and wane of influence among different participants are considerations with heavy political weight in policy games. Scientific answers to these questions are of great theoretical value because they would help us grasp the essence of the decision-making process and gain an insight into the interactive game between the participants and the consensus-reaching mechanism. It is out of such considerations that we have chosen to examine public policy processes in China from the perspective of the participants' influence on decision-making.

Since the making of policies in different fields and at various levels tends to show different features, it is very difficult to create a unified model for the general policy-making process in China. The present study is focused on the sphere of technological policies. In Western countries, there has been a transition from elite to community as the leading makers of such policies, and the trend of participation by interest groups and the public is becoming more and more apparent. In China, however, participation in S&T decision-making by businesses and the public remains scant, and the elite (including the political elite and the intellectual elite) is still dominant (Li Xia and Runchuan, 2001; Li Xia 2007; Chen Ling, 2005), with officials and scientists occupying most of the policy arena. In view of this situation, we have ignored participants like businesses and the public, and have only considered the two major actors (officials and scientists) and discussed their interactive game and influence in decision-making. Since the influence of one usually increases in proportion to the decrease of the other's, to understand the issues related to the influence of one side is tantamount to outlining the decision-making pattern of both sides. Therefore, we have further narrowed down our study to concentrate on scientists' influence on decision-making.

At present, research into scientists' policy participation is mainly conducted from three theoretical perspectives – policy science; science, technology and society (STS); and the knowledge utilization theory. Policy science is interested in how expert politics and democracy operate, STS stresses the social construction of scientific knowledge and scientists' activities on the border between science

and policies, and the knowledge utilization theory focuses on the effects of the use of knowledge in policy processes and the influencing factors. Scientists' influence on decision-making is a subject of common interest for all the three perspectives, and scholars have contributed a lot in this respect. However, in the existing studies, the examination of scientists' role in and influence on policy-making is largely limited to partial discussions on micro-levels, and a macro-framework of analysis has yet to be established. It is therefore our intention to bridge this theoretical gap by creating a framework for overall analysis based on systematic examination and differentiated integration of the determinants of scientists' influence.

1.1.2 Scientists' participation in S&T decision-making in China

CPC organizations play a core role in public decision-making in China's political decision-making system. People's congresses at all levels and their standing committees are the top decision makers in a legal sense in their respective regions. They are the top authority, nationally or locally, exercise legislative power and supervise policy implementation by the government. The State Council is the top administrative body of China. The heads of the State Council and local governments have the final decision-making power and take responsibility for their decisions. Multiparty cooperation and political consultation under the leadership of the CPC are basic political systems of China, and democratic parties influence the CPC's decision-making through participation in the deliberation and administration of state affairs and democratic oversight. The Chinese People's Political Consultative Conference (CPPCC), an important body for promoting multiparty cooperation and political consultation, influences and participates in the decision-making of people's congresses and governments in the form of organization. Such a decision-making system forms the cornerstone of China's decision-making model.

It is generally believed in academia that China's political decision-making mechanism is a typical one of elite decision-making (Lampton, 1992) and a main characteristic is that, in the political process led by political elites, a decision is made mainly based on the top leadership's consideration of the reality and a top-down approach, while it is very hard for bottom-up policy initiatives to automatically include policy needs in the political process. Economic and social development has brought about a more diverse composition of elites. Intellectual, social, economic and other elites have more opportunities to directly participate in the political decision-making process, and the number of elites who can influence decision-making is also growing. The decision-making interactions between different elite groups are increasing and more political decisions have been made as a result of such interactions. Although political elites on the top level remain the final decision makers, their freedom to choose policies is being reduced (Wei Shuyan, 2006).

In terms of S&T policies, the top administrative body for decision-making is the State Council under which there is a National Leading Group for S&T and Education, a core decision-making and coordination organization in the field of

S&T. The Leading Group is responsible for strengthening overarching guidance on S&T and education work and coordination of major S&T matters and promoting the reform of S&T and education systems. The head of the Leading Group is Premier of the State Council, deputy head is the Vice Premier or State Councilor in charge of S&T and education work, and its members include leaders of relevant ministries such as the Ministry of Science and Technology (MOST) and Ministry of Education (MOE). As part of the State Council for the overall coordination of S&T affairs in China, MOST is mainly responsible for mapping out the macro strategies for S&T development as well as the guidelines, policies and regulations on giving play to the role of S&T in driving economic and social development, studying major issues concerning the role of S&T in driving economic and social development, planning for S&T development and identifying priority areas, facilitating the building of a national S&T innovation system, etc. Other organizations that play an important role in S&T decision-making and management include institutions of higher learning led by MOE, research institutions led by the Chinese Academy of Sciences (CAS), Chinese Academy of Engineering (CAE) and Chinese Academy of Social Sciences (CASS), and science foundations represented by National Natural Science Foundation of China (NSFC). In addition, economic authorities such as National Development and Reform Commission (NDRC) and Ministry of Finance (MOF), specialized ministries such as Ministry of Industry and Information Technology (MIIT) and Ministry of Agriculture (MOA) are also important stakeholders in the S&T decision-making system. China's current S&T decision-making and management system is shown in Figure 1.1.

Scientists as intellectual elites are the core participants of China's political decision-making process. Their role in S&T decision-making is even more significant.

Since the founding of the People's Republic of China (PRC), scientists and experts have taken part in the making of decisions on science and technology policies in various ways. They have played a prominent role in many important S&T decision-making processes. For instance, in January 1955, Mao Zedong personally chaired a meeting to listen to scientists' opinions on the decision to launch the great project of developing the A-bomb, the H-bomb and artificial satellites (Lu Yongxiang, 2003); in 1956, over 600 scientists, technologists and technological management experts participated in the drafting of the PRC's first plan on S&T development (Long-Term Plan for Scientific and Technological Development 1956–1967); in 1986, Wang Daheng and three other scientists wrote a letter to Deng Xiaoping calling for developing hi-tech research in China, which led to the 863 Program. With the development of the Chinese economy and the furthering of the efforts towards more scientific and democratic decision-making, a large number of experts have become involved in the making of decisions on social and economic development, which has greatly enhanced the scientific level of decision-making. For instance, many scientists have contributed important advice and suggestions to the feasibility study and the selection of designs for major national projects such as the Three Gorges Dam, the Qinghai-Tibet Railway and the South-to-North Water Diversion Project.