2.1.2 The STI policy process

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Lead Text

The science, technology, and innovation (STI) policy process is characterized by the need for strategy, the importance of agenda setting, the magnitude of spatial and temporal externalities, and low salience. In light of these factors, this paper explains what form the policy process should take from the perspective of evidence-based/evidence-informed policy making (EBPM/EIPM), with an emphasis on agenda-setting methods.

Keywords

Agenda, policy process, policy options, logic models

1 The STI policy process

1.1 What elements are unique to the STI policy process?

What are the differences between “science, technology, and innovation (STI) policy” and “science and technology (ST) policy,” that is, what elements are unique to STI policy? What characteristics do these elements bring to the policy process? While ST policy is also intended—and functions—to promote innovation, STI policy is characterized by its explicit promotion of innovation and its main objective of building a system that facilitates the creation of innovation in society as a whole. In this respect, innovation is defined not as mere technological innovation, but as innovation that develops intellectual and cultural

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value through science and technology and leads to the creation of economic, social, and public value[3]. As its objectives include changing the behavioral patterns of people and organizations, STI policy requires a strategic approach. The STI policy process differs from "policy for science, technology, and innovation" (promotion) and "science, technology, and innovation policy for policy" (responses to issues) in some respects. This section primarily focuses on the former, "policies for STI" (promotion); however, as discussed in 2.1.1, the two cannot be entirely separated.

Policy for STI varies from top-level plans and strategies, such as the Science Technology Basic Plan (the Science, Technology and Innovation Basic Plan from the sixth plan onward) and the Comprehensive Strategy for Science, Technology and Innovation, to the policy group, policy, program, and project levels. In terms of content, it can also be categorized into human resources, knowledge, and funding—that is, human resource development policies, R&D fund allocation policies, intellectual property policies, and research infrastructure development policies. The process of policy for STI begins with the identification and setting of an agenda, followed by the formulation of policy options and their preliminary evaluation, and then by policy decisions and ex-post evaluation following their implementation. The ex-post evaluation leads to the discovery of new issues, resulting in the formation of a cycle. The following are three characteristics of the policy for STI process:

1. The first is the importance of an overall strategy based on a reasonable understanding of the mechanisms of innovation creation. To this end, the Council for Science, Technology and Innovation has been established as a nerve center, together with a Science and Technology Basic Plan formulated every five years and a Comprehensive Strategy for Science, Technology, and Innovation developed annually based on the Basic Plan. These define the policy for STI system.

2. The second is that they often target big science, which involves large research facilities and large research expenditures that are difficult for the private sector to invest in alone (see also 2.0.3), and thus invariably have large positive externalities[4]. In other words, viewed in terms of the effects of investment, these effects are wide-ranging when including spillover effects. They are also characterized by the fact that it takes time for outcomes to be realized. This can create difficulties in policy evaluation (see 2.2.4).

3. Third, many policies for STI are characterized by low-salience policy areas (i.e., are difficult for ordinary voters and politicians to take interest in and thus become an election issue), partly because of their high degree of specialization and partly because of the greater role of serving as a nerve center composed of non-politicians. In such cases, there will be relatively little political intervention in the policy process. However, in rare cases, it can become a political issue with

3 The Fourth Science and Technology Basic Plan defines "science, technology, and innovation" as "the creation of intellectual and cultural value based on new knowledge through scientific discoveries and inventions, and innovation that develops this knowledge into the creation of economic, social, and public value."

4 In recent years, there have been examples of wealthy individuals independently investing in large-scale research and development projects previously thought to be impossible without public funding, such as the active space development efforts of Elon Musk and Jeff Bezos.

debate over its costs and benefits[5]. In such instances, the difficulty of explaining the effects—the second feature mentioned above—comes to the fore.

1.2 Identifying and setting agendas

The policy for STI process begins with the identification and setting of an agenda. In today's world of rapid social and technological change, it is especially important to identify and set agendas. Indeed, as the range of actors who should participate in the policy process expands (see 2.1.1) and their values become more diverse, there is a need for accountable and transparent agenda-setting based on objective evidence. For this reason, methods of agenda-setting have themselves become the subject of research. As noted, the creation of a plan or strategy can itself be seen as a policy for STI. There is a nested structure in which the discovery and setting of issues (agendas) is itself a policy output, as it involves the discovery and setting of issues (agendas) for that policy. This section examines the unique elements of STI policy, focusing on issue (agenda) discovery and setting, which is the first step in the policy for STI process, and can be regarded as a policy for STI in itself.

Issues (agendas) can be set internationally or domestically. Examples of the former include the G7 Science and Technology Ministers' Meeting and OECD agenda setting. One of the themes of science and technology diplomacy is how to take the lead in setting the agenda. The world's best-known agenda is the 2030 Agenda for Sustainable Development, or the Sustainable Development Goals (SDGs), which were adopted in 2015 and consist of 17 goals and 169 targets. While the previous Millennium Development Goals (MDGs) were formulated through closed discussions led by the United Nations (top-down approach), a transparent intergovernmental negotiation process open to all stakeholders (bottom-up approach) was adopted for the formulation of the SDGs. More specifically, the Open Working Group for Sustainable Development Goals (OWG) was established and comprised thirty experts nominated by member countries, with the world divided into five regional groups. A total of thirteen meetings were held between March 2013 and July 2014, and a report incorporating the SDGs was submitted in August 2014. Opinions from various stakeholders were incorporated into the report during these meetings. The 17 goals and 169 targets agreed upon through subsequent negotiations between member states were adopted by the UN General Assembly in September 2015. The SDGs have been used as an agenda for proposing specific policies for STI in many countries and in a variety of sectors[6].

The Science and Technology Basic Plan and the annually-formulated Comprehensive Strategy for Science, Technology and Innovation play a fundamental role in the setting of the domestic agenda. The Council for Science, Technology and Innovation (CSTI) is responsible for these tasks. The fourth chapter of the Fifth Science and Technology Basic Plan lists the issues of strengthening human resources,

5 Examples include supercomputers in the review and prioritization of government programs, and the debate on the existential value of humanities and social sciences in universities.

6 Some critics argue that the SDGs fail to prioritize and narrow down their goals and targets because they target both developing and developed countries and emphasize the participation of stakeholders with diverse opinions and positions. While the role of mass media in agenda setting is generally significant, it may be less so in low-salience cases such as policy for STI. Nonetheless, it may be necessary to pay attention to the role of mass media coverage in cases that attract political attention.

knowledge base, and financial resources as “fundamental capabilities” in response to the thirteen important policy issues listed in Chapter 3. In Chapter 5, the policy agenda for the construction of these systems of virtuous cycles includes “strengthening mechanisms to promote open innovation,” “strengthening the creation of small and medium-sized venture businesses taking on the challenge of new businesses,” “strategic use of international intellectual property and standardization,” “reviewing and improving systems for creating innovation,” “building innovation systems that contribute to ‘regional development’,” and “developing opportunities for innovation creation that anticipates global needs.” Policy-, program-, and project-level agendas are set based on these strategies.

1.3 Policy formation, implementation, and ex-post processes

Once issues (agendas) are set and prioritized, policy options for solving the issues are formulated and preliminary evaluations (cost, output, and outcome projections) are conducted. Policy decisions are then made on the basis of these evaluations and the policy is implemented. After a certain period of time, an ex-post evaluation is conducted to examine the causes of differences from the preliminary evaluation, and the policy is reviewed to solve the issues identified through the ex-post evaluation. These are referred to as “policy processes” in academic terms. In political science, there is an academic interest in the power arrangement between actors with stakes in a policy, and attempts have been made to model actual policy processes. The following illustrates the basic process for Evidence Based Policy Making (EBPM), or Evidence Informed Policy Making (EIPM).

There are many options for solving the issues (agendas) that have been raised. It is important to list as many options as possible at the outset. For each policy option, the path (assumed cause-and-effect relationship) leading to the solution to a problem must be presented in an easily understood “logic model.” Then, the human and financial resources (inputs) and benefits (outputs and outcomes) required to implement each option, institutional and cultural barriers, and the possible secondary and spillover effects are forecast and listed. Policy effects must take into account not only targeted effects, but effects on the economy, environment, and society as a whole. For this reason, it is essential to collect a wide range of available evidence, and engaging in dialog with a variety of stakeholders offers an important source of information. It is also worth noting that evidence can range from weak to strong and can be qualitative or quantitative in nature (see 2.2.1 for evidence and 2.2.3 for regulatory science). The participation of diverse stakeholders should be ensured in the policy process, and in the final policy decision, decision makers should be able to explain in easily-understood terms the rationale for the chosen option in respect to both its costs and benefits. The collection and generation of evidence in the policy process may be outsourced to private institutions or academic organizations. On the other hand, there are cases where recommendations from institutions like the Science Council of Japan and academic societies or reports from councils are themselves considered “evidence.” Nonetheless, even in such cases, comparisons with other options and analyses of the costs and effects of the policy—that is, explanations of the rationale for policy decisions and disclosure of expected impacts—are essential. Once a policy has been implemented, it is necessary to conduct an ex-post evaluation after a period of time in order to ascertain its outcomes and the achievement

of the goals, and to utilize them in subsequent policy development. As there is a good chance that unexpected obstacles may arise in the implementation of policies, ex-post evaluation should be incorporated in advance of a policy's implementation. In addition, for effective ex-post evaluation, some indicators should be set as KPIs in advance and monitored. Accordingly, ex-post evaluation should be positioned as a space to discover new issues (agendas) while referring to the state of socioeconomic and technological development at home and abroad.

References

Akiyoshi, Takao. (2017). *Nyūmon kōkyō seisaku-gaku: Shakaimondai o kaiketsu suru* `atarashī chi' [Introductory public policy studies: "New knowledge" to solve social problems]. Chuko Shinsho. http://www.chuko.co.jp/shinsho/2017/06/102439.html [In Japanese]

National Graduate Institute for Policy Studies. (2014). 2013 MEXT Commissioned Project, "Trial initiative for promoting 'science for policy' in science, technology and innovation policy" survey research results.
https:// scirex.grips.ac.jp/resources/archive/140612_395.html [In Japanese]