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Part I

Macro and Micro Policy Dimensions

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ONE

Introduction

A Critique on Contemporary S&T Policy and Progress

Interrogating science and technology (S&T)¹ in China must begin with a chapter on critiquing contemporary S&T policy and progress in general for three main reasons. First, S&T in contemporary China have been beginning to be more like the S&T elsewhere, particularly resembling the Western model, leaving behind many of its Maoist legacies. Second, the issues that confront S&T including policy and progress in China at present are akin to those in other countries, given their increasing importance in the realms of economy, society, and polity. Third, the future of S&T progress in China is closely dependent on the S&T policy in other countries, particularly in the present context of increasing complex interdependence and globalisation.

More often than not S&T are reduced to a mere statistic of numbers of research and development (R&D) institutes, universities, patents, R&D expenditure, and so on. While these statistics are useful indicators of the growth and development of S&T and give us some clues about the manner in which S&T are evolving, they are, however, insufficient for a fuller and holistic understanding of S&T policy and progress. In fact, sometimes there is very little discussion on the way S&T are evolving and impacting various facets of human life. Keeping this lacuna into account, this study intends to take a broader perspective in locating S&T policy in the context of the evolution of

¹ In this study, science and technology are referred to in plural in contrast to the standard usage in singular. The primary reason for doing so is to recognise the distinctive features of the two.

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policy studies. Moreover, since this chapter is about S&T policy and progress, some sort of balance is maintained in factoring both analytical as well as prescriptive elements. In fact, this balance runs through the entire study.

S&T policy has been at a critical juncture in its trajectory of evolution since the beginning of the twenty-first century due to multiplicity of factors that have been making it much more complex and variegated. This process will become more complex as new technologies emerge from various institutions and countries and could eventually change the very face of S&T policy and progress. Take, for instance, the recent characterisation of China as a rising S&T superpower and the new identity that India acquired in the last two decades from being a land of snake charmers to the land of software professionals. What is quintessentially crucial for the S&T development is a combination of factors such as policy under the direction of states, MNCs' forays into the core of S&T, globalisation, and market. Of all these, policy-making and implementation had been playing a major role in directing the development of S&T in the developed and the developing world, leading to both benefits and costs. While benefits seem to far outweigh the costs in the short run, the impact of costs on the society in the long term cannot be discounted. The two central questions that need to be raised in this context are: what could be some of the costs that humanity will be paying in the long run if science develops the way it is developing now; and more importantly, can S&T be directed in any way other than how they have been developing over the last few decades, particularly since the 1950s, ever since policy formulation and implementation came to be the major preoccupation of the Western and non-Western world, including the newly established states. These questions are pertinent precisely because of the existence of possibilities for an alternative trajectory of the development of S&T where *people*, rather than *profit*, are at the heart of its framework.

A number of civil societal organisations such as Friends of Nature, Global Village of Beijing, Green Home in China, and Centre for Science and Environment (CSE) and Research Foundation for Science Technology and Ecology (RSFTE) in India have been tirelessly working towards changing the course of the development of S&T through their involvement in the discourse on science as well as through various creative campaigns. While these efforts, different from the ones that the state promotes, are laudable and contribute to the growth of S&T, they are insufficient to change their trajectory. In fact, the crux of the problem lies at the heart of the S&T policy-making. If the path of the current development of S&T has to be changed, then, it must begin with policy -making and its implementation by the political leadership and

the bureaucracy that formulate the policy and implement it. One of the central contentions, therefore, is that both the political leadership and the bureaucracy are not adequately equipped to do so. They need to include various stakeholders, such as scientists of all perspectives, critics of science, civil society, firms, and common people, in the process. A difficult task, nevertheless an effective one, which can change the very face of S&T, making them much more responsive to the real needs of the majority and also responsible to the taxpayers. S&T, coupled with commitment to social reality, remain the best hope for reducing inequality and poverty. In this process, policy in its three-fold structure of formulation, implementation, and evaluation plays a pivotal role. The vital question is how S&T policy can be shaped to address the issues of poverty and inequality.

Against this backdrop, this chapter is divided into three broad sections. Since S&T policy shares certain similarities with policy studies in general, which have immense potential to have a deep impact on the former, the first section locates S&T policy in the larger policy studies framework to see whether S&T policy has been benefitting from it. The second section makes an attempt at conceptualisation, genesis, evolution, and determination of the currently burgeoning texture of S&T policy. The third section delineates the current S&T progress and elucidates how it is being shaped by various stakeholders, forces, and processes in the light of the insightful framework that Robert Chambers developed in the context of development studies wherein the thrust is on whose reality counts. The last section summarises the central arguments of the chapter.

1.1 Conceptualising S&T policy within the framework of policy studies

Most studies on S&T policy locate it within the broad analytical and methodological framework of Science and Technology Studies (STS). Take, for instance, Aant Elzinga's and Andrew Jamison's insightful piece on 'Changing Policy Agendas in Science and Technology',² which is oblivious to the linkages between S&T policy and policy studies. In contrast to the STS, there is a slightly different genre of thought and literature known as Social Studies

² Aant Elzinga and Andrew Jamison. 'Changing Policy Agendas in Science and Technology.' In *Handbook of Science and Technology Studies*. Edited by Sheila Jasonoff, 572–97. Thousand Oaks: Sage Publications, 1995.

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of Science (SSS), which uses a different analytical framework.³ Even SSS is silent on this. In fact, the phenomenon of lack of linkages between S&T policy and policy studies is observable in most studies on S&T policy.⁴ It is seldom situated within the methodological framework of policy studies. In order to fill this gap and better understand S&T policy, this chapter examines S&T policy within the broad confines of policy studies. In other words, this study would problematise the analytical and disciplinary relationship between S&T policy and policy studies.

S&T policy began to evolve in a concerted manner from the beginning of the twentieth century and reached somewhat matured levels in the 1950s. This process coincided with the emergence of policy studies, with immense potential to impact S&T policy. Though they grew simultaneously, it is unclear whether there has been a regular flow of frameworks, methodologies, and analytical tools from the policy studies to S&T policy architecture, making the latter much more effective and diverse. However, one can make a case for some tentative premise of some flow of typologies, taxonomies, and frameworks from policy studies to S&T policy in the form of three broad settings: formulation, implementation, and evaluation.

Evolution of policy studies

Before elaborating on this vital issue of evolution of policy studies, some discussion on policy studies is necessary at this stage. To begin with, there is

³ The analytical distinction between STS and SSS is quite blurred to recognise easily. One way of understanding it is by focusing on their respective foci of analysis. STS is centred more on the development of S&T, while SSS is concerned with the social dimensions of S&T. There is no consensus among the scholars about this distinction. Sometimes STS tends to take the SSS concerns into its gamut. In fact, STS itself, as Gary Bowden argues, is slowly coming to its adulthood after a few decades of its growth. See Gary Bowden. 'Coming of Age in STS: Some Methodological Musings.' In *Handbook of Science and Technology Studies*. Edited by Sheila Jasanoff et al., 64–79. Thousand Oaks: Sage, 1995.

⁴ See, for instance, Dorothy Nelkin. 'Technology and Public Policy.' In *Science, Technology and Society: A Cross-disciplinary Perspective*. Edited by Spiegel-Rosing and D. de Solla Price, 393–442. London: Sage Publications, 1977. Harvey Brooks. *Current Science and Technology Policy Issues*. Washington, DC: Washington University Press, 1985. Sheila S. Jasanoff. 'Contested Boundaries in Policy-relevant Science.' *Social Studies of Science* 17, no. 2 (1987): 195–230. Harvey Brooks and Chester Cooper, eds. *Science for Public Policy*. Elmsford, NY: Pergamon Press, 1989.

no consensus among the scholars about the nomenclature of policy studies: whether it should be studies or sciences. The scholarly community seems to be divided on this issue, one group preferring the term ‘policy studies’, while the other preferring ‘policy sciences’. Those who call it studies, mostly from Europe, seem to emphasise its inexact nature, while the other group, mostly from North America, chooses to highlight the exactness of policies. In this study, the concept of policy studies is used primarily by recognising the fact that as a discipline, it does not aspire to be a science on the lines of the natural sciences.

It is only in the 1950s that policy studies has emerged as a distinct discipline.⁵ This discipline has been making immense contributions to our understanding of policy – its formulation, implementation, and evaluation, specifically through the pioneering work of Harold Lasswell⁶ and many of his successors in the US, and several others from outside the US.⁷ Being a new discipline, in its initial stages, it drew many theoretical frameworks from other disciplines such as political science, economics, and sociology. As a result, it evolved into a multidisciplinary study in its nature and scope, with a specialised set of frameworks. Though policy studies scholars incorporated a number of approaches from other social sciences and benefited from them, they have nonetheless neglected some other useful frameworks. A major problem with the policy studies is their preoccupation with policy-centred policies rather than people-centred policies, though it is commonly agreed upon that policies are made for people. In this regard, the state has been a dominant actor and the approach used in formulating policies is ‘top-down’. These two processes came under severe criticism from a number of development theorists and practitioners such as Robert Chambers,⁸ who advocated for people to be factored into the formulation, implementation, and evaluation of policy.

In the last five decades, policy studies has been evolving from the larger policy movement consisting mainly of policy analysis and policy-making. Broadly in agreement with this proposition, Yehezkel Dror, towards the end

⁵ This is more recent than International Studies, which precedes it by two decades.

⁶ Harold Lasswell. *A Pre-View of Policy Sciences*. New York: American Elsevier, 1971.

⁷ There seems to be very little interaction between policy scientists in America and elsewhere. For instance, while reviewing the future of policy sciences in 2004, some of the American successors of Lasswell, who are part of the Policy Science Association and run *Policy Sciences* journal do not even refer to any of the seminal and authoritative studies in *Encyclopaedia of Policy Studies* edited by Stuart Nagel published a decade earlier.

⁸ See Chambers. *Rural Development: Putting the Last First*. Essex: Longman’s Scientific and Technical Publishers, 1983. Chambers. *Whose Reality Counts? Putting First the Last*. Southampton, London: Intermediate Technology Publications, 1997.

of the twentieth century, notes that the present policy-making knowledge is grossly inadequate for meeting the challenges of the twenty-first century and hence there is a need for a pragmatic jump towards what he calls 'advanced policy sciences'.⁹ Recognising the fact that policy studies continuing to revolve around a US-based culture, Dror calls for the need to globalise policy sciences, not in the sense of diffusing its present version around the world, but of broadening and diversifying the cultural foundations and reality perceptions of advanced policy sciences.¹⁰

Though some new generation scholars of policy sciences have raised the issue of future sustainability,¹¹ their contribution to developing tangible and useful analyses of policy cannot be disregarded. A major contribution in the last few decades of its history is in evolving a unique problem-oriented, contextual, and multi-method analytical framework, which came to be used by the distinct streams of state policy such as S&T policy, agricultural and industrial policy, and so on. The co-evolution of various policies and policy sciences makes the interface between the two rather interesting and fascinating. In the twenty-first century, policy sciences are trying to carve a niche and stand on their feet and become more contemporary and relevant both theoretically as well as practically.¹² Martin Hazer, in an interesting study of policy, asserts that the context of policy has changed dramatically over the last few years with the political institutions involved in policy-making under pressure from various quarters such as the newly emerging civil society. His contention is that 'policy sciences must come to grips with the fact that they can no longer take the political setting as given'.¹³ He goes on to argue that the Lasswellian framework of policy science of democracy further makes it much more diverse than political theory.

⁹ Yehezkel Dror. 'Basic Concepts in Advanced Policy Sciences.' In *Encyclopaedia of Policy Studies*. Edited by Stuart Nagel, 1–30. New York: Marcel Dekker, Inc., 1994.

¹⁰ *Ibid.*, 4.

¹¹ Roger Pielke Jr. 'What Future for the Policy Sciences.' *Policy Sciences*, 37 (2004): 209–25.

¹² See the special issue of *Policy Sciences*, 37 (2004) where Stephen Brown sets the debate in the larger historical context followed by Roger Pielke Jr. who raises the sustainability of policy sciences and calling for unity among policy scientists. The debate concludes on a more positive note of Rodney Muth arguing that policy sciences are integrative with the ability to conceptualise broadly and harmonise disparate perspectives.

¹³ Martin Hazer. 'Policy without Polity? Policy Analysis and the Institutional Void.' *Policy Sciences* 36 (2003): 175–95.

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Policy studies methods

Over the last few decades, policy studies, under the broad influence and rubric of social sciences, developed a number of methods such as quasi experimental research designs, survey research, multiple regression analysis, input–output analysis, operations research, systems analysis, mathematical stimulation, and cost–benefit analysis to explain various dimensions of the social reality. Besides these, various models of policy-making have also evolved within the larger sphere of policy studies. Of them, four are pertinent to our discussion, as explained by Michel Howlett and Jeremy Rayner¹⁴ in their study. These are *stochastic*, *historical narrative*, *path dependency*, and *policy sequencing*. Howlett and Rayner conclude in their study that of these four, policy sequencing is the most comprehensive in factoring a number of policy dynamics of pre-policy, policy, and post-policy¹⁵ contexts into its framework. Besides these models, a few approaches have also evolved within the policy studies. Of these, two are relevant for our purposes. *Incremental approach* is one of the two which argues that ‘choice rarely departs far from previous patterns’. The other approach to be considered here is the *cycle approach*, mentioned by Kirlin in discussions on his seven-phase decision-making process.¹⁶

At the heart of these methods developed within policy studies, was the objective of empirical inquiry. But the empirical inquiry does not address all the dimensions relating to social reality. Therefore, we need a broader perspective, which is found in the *postpositivist perspective* that Frank Fischer developed to assess policy.¹⁷ Postpositivism, according to Fischer, is designed to address the multidimensional complexity of social reality. As a discursive orientation in practical reason, the postpositivist perspective situates empirical inquiry and delineates policies in a broader interpretative framework. As Fischer notes, unlike social sciences, ‘policy sciences were more ambitious to

¹⁴ Michel Howlett and Jeremy Rayner. ‘Understanding the Historical Turn in Policy Sciences: A Critique of Stochastic, Historical Narrative, Path Dependency and Policy Sequencing Models of Policy-making over Time.’ *Policy Sciences* 39 (2006): 1–18.

¹⁵ The rationale behind dividing policy into three phases is to make a distinction between the absence of coherent policy and the emergence and broadening of policy in the history of a country.

¹⁶ John Kirlin. ‘Policy Formulation.’ In *Making and Managing Policy*. Edited by G. Ronald Gilbert, 13–24. New York: Marcel Dekker Inc., 1984.

¹⁷ Frank Fischer. ‘Beyond Empiricism: Policy Inquiry in Postpositivist Perspective.’ *Policy Studies Journal* 26, no. 3 (1998): 129–46.

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develop methods and practices designed to settle rather than stimulate debates'. He further argues that this traditional understanding of the policy analytic represents an epistemological misunderstanding of the relationship between knowledge and politics. Underscoring the impact of social sciences on policy studies with reference to the 'fact-value dichotomy', Fischer elucidates that the latter 'sought to translate inherently normative political and social issues into technically defined ends to be pursued through administrative means'. The central point of his argument is that

there can be no complete 'factual' description entirely independent of the social circumstances under which it is made; in effect, science measures an interpretation of the object rather than the object per se. Under such circumstances the possibility of conclusive proof largely has to be ruled out.

One of the other useful articulations of the relevant concepts of policy studies comes from Marie Lall's study,¹⁸ which reviews some of the influential and recent debates on policy studies. Using the concept of policy cycle developed by Stephen Ball, Richard Bowe, and Anne Gold,¹⁹ she emphasises that both the *process* and the extent to which the *state* (emphasis added) determine policy are the key to understanding the various dynamics of policy. While the role of state in policy formulation, execution, and evaluation cannot be underestimated, its primacy is now being challenged by various quarters, making both the dynamics of policy and consequently the study of policy sciences much more complex. Exploring this complexity is the central thrust of this chapter. After reviewing *policy as text*, Lall takes the debate to *policy as discourse*.²⁰ While both these approaches to policy are quite insightful and useful to understand policy, we need to look at another approach, what I call *policy as practice*. This aims to establish the continuum between policy as text and policy as practice. It is also intended as a tool to understand and analyse how much of what is planned as a policy is put into practice. It interrogates not only the process of policy

¹⁸ Marie Lall. *A Review of Concepts from Policy Studies Relevant for the Analysis of EFA in Developing Countries*. Research Monograph No 11: 27. Brighton: Consortium for Research on Educational Access, Transitions and Equity (CREATE), 2007. <http://sro.sussex.ac.uk/1859/1/PTA11.pdf>. Date of access: 7 May 2012.

¹⁹ Stephen Ball. *Reforming Education and Changing Schools: Case Studies in Policy Sociology*. London: Routledge, 1992.

²⁰ For more on these two issues, see Stephen Ball. *Education Reform*. Buckingham: Oxford University Press, 1994 and Stephen Ball. 'Some Reflections on Policy Theory: A Brief Response to Hatcher and Troyna.' *Journal of Education Policy* 9, no. 2 (1994): 171–82.