Models of Science & Policy: From Expert Demonstration to Extended Participation

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Our modern (Western) civilisation is based on science in several ways. Science is the basis of the material culture which has so transformed the world; and it is also a primary source of legitimation for policy arguments. As science-related policy issues have come to be recognised as complex and more inherently difficult of solution, the conception of the role of science has also developed and matured. Today, when science is deployed in the policy context, we are aware of the possibility that facts are uncertain, values in dispute, stakes high and decisions urgent. These last features define what we call a post normal science problem. In the light of this new understanding, we can identify several conceptual models of the relation between science and decision-making in policy processes. We trace their evolution through a deepening appreciation of the process of the use of science in policy.

The 'modern' model (perfection/perfectibility).

Scientific facts (unproblematic), employed in rigorous demonstrations, would determine correct policy. In classical terms, the true entails the good; in modern terms, truth speaks to power. Being based on scientific facts, the power that is exercised is effective. There are no limits to the progress of man's control over his environment, and no limits to the material and moral progress of mankind. This is the classic 'technocratic' vision, dependent on an assumed perfection/perfectibility of science in theory and practice.

Precautionary model (uncertain and inconclusive information).

In real policy processes, it is discovered that the scientific facts are neither fully certain in themselves, nor conclusive for policy. Progress cannot be assumed to be automatic, and control over the environment can fail, leading sometimes to pathological situations. While all sides still pay homage to the truth/validity of science in general, they each contest particular unwelcome items of information. Because of this imperfection in the science, there is an extra, normative, element in policy decisions, precaution, which both protects and legitimises decisions.

Framing (arbitrariness of choice and possible misuse).

In the absence of conclusive facts, scientific information becomes one among many inputs to a policy process, functioning as evidence in the arguments. Debate is known to be necessary, as different stakeholders have their own perspective and values shaping their arguments. Moreover, all such processes involve complex issues, where the situation has a plurality of phases (causes, effects, prevention, remediation, etc.), each with its own theoretical constructions of reality. There are no simple 'facts' that resolve issues in all these phases and aspects. Hence the framing of the relevant scientific problem to be investigated, even the choice of the scientific discipline to which it belongs becomes a prior policy decision, part of the debate among those affected by the relevant issue. Different scientific disciplines become competing stakeholders; whoever 'owns' the research problem will make the greatest contribution and will enjoy the greatest benefits. There is no conclusive scientific basis for the choice of framework, and hence to some extent the choice is arbitrary (or social).

Demarcation (possibility of abuse of science).

The scientific information and advice that are used in the policy process is created by people working in institutions with their own agendas. Experience shows that this context can affect the contents of what is offered, through the selection and shaping of data and conclusions. Although they are expressed in scientific terms, the information and advice cannot be guaranteed to be objective and neutral. In this sense, science can be abused when used as evidence in the policy process. A clear demarcation between the institutions (and individuals) who provide the science, and those where it is used, is advocated as a means of protecting science from the political interference that would threaten its integrity. It also ensures that political accountability rests with policy makers and is not shifted, inappropriately, to the scientists. In addition, it prevents scientists from using the authority of their status as an illegitimate validation of their pronouncements when they engage in partisan advocacy on contentious policy issues. However, too great a separation can result in the scientific institutions pursuing their own, internal goals, and the work becoming irrelevant to the needs of the policy process. Designing the right form of demarcation of science and policy is therefore one of the urgent tasks of governance.

Extended participation

Given these acknowledged imperfections in the deployment of science in the policy process, it becomes ever more difficult to defend a monopoly of accredited expertise for the provision of scientific information and advice. 'Science' (understood as the activity of technical experts) is included as one part of the 'relevant knowledge' is brought in as evidence to a process. The ideal of rigorous scientific demonstration is replaced by that of open public dialogue. Citizens become both critics and creators in the knowledge production process as part of an extended peer community. Their contribution is not to be patronized by such labels as 'local', 'practical', 'ethical' or 'spiritual' knowledge. A plurality of co-ordinated legitimate perspectives (with their own value-commitments and framings) is accepted. The strength and relevance of scientific evidence is capable of assessment by citizens. All sides come to the dialogue ready to learn, or else the process is a sham. Through this co-production of knowledge, the extended peer community creates a democracy of expertise in the context of post normal science.

Summary

We can see the latter four models as a progression from the initial 'modern' model with its assumption of perfection of science in the policy process. All this had initial expressions in the debates of the 1970s, when ‘progress’ started to come into question. It has emerged in the policy domain notably in the last decade, starting with the proclamation of 'precaution' at Rio 1992. The post-normal science framework, a part of this evolution, was already published at the beginning of the 1990s, the decade of ‘sustainability’ and precaution; but it has come to prominence only more recently as a result of the debate on governance. The three models of imperfections can be seen to form a sequence of increasing severity, admitting incompleteness, misuse and abuse. Each is designed to resolve a particular type of anomaly, and in any real situation they may be complementary or in conflict. But in each case, the desire is that the link between science and policy remain direct and unmediated. In the successive models, we see that (a) policy is modified by precaution, (b) problems are framed by stakeholders, or (c) scientists are protected from political interference. But the core activity of the modern model, the experts' *(desire for)* truth speaking to the politicians' *(need for)* power, is unchanged. The final model, of extended participation, involves a change in the form of governance. Implementing this is a great challenge of our time; for without it, 'the consent of the governed' in science related policy issues will not be maintained.

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