Chapter I
INTRODUCTION

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Demonstration projects have become increasingly important in Federal Government research and development (R&D) programs. They are used in such diverse areas as energy, transportation, environmental quality, health, water resources, aeronautics, education, and income maintenance. The resources allocated to demonstrations are substantial. One study estimated that approximately $625 million of the Federal civilian R&D budget was allocated to demonstrations in FY 1974; [1] an update of that estimate placed the funds for demonstrations at roughly $860 million for civilian R&D in FY 1977.[2] Another study estimated funds of $400 million for social program demonstrations in FY 1976.[3] Reliable data for prior years are not available; it is clear, however, that Federal support for demonstrations has increased at a rapid rate and that continued increases in funding are likely.

It might be reasonable to assume from their apparent popularity that demonstrations are a well understood and highly effective instrument of Federal policy. But this is not the case. Demonstrations are poorly understood and their effectiveness is open to question.

One reason for our limited understanding of demonstrations is the lack of an agreed upon definition. An analyst, several years ago, referred to "the 'demonstration-research' project as the major instrument for social planning in American communities today. "4 Another analyst of social programs distinguished among experimental, developmental, and demonstration projects, defining the latter as aimed at "showing administrative and/or political feasibility. "s A forthcoming study of social research and development by the National Academy of Sciences (NAS) defines a demonstration as "a small-scale program undertaken in an operational setting for a finite period of time to test the desirability of a proposed course of action ."s A recent study of energy policy defined the purpose of energy technology demonstrations as "providing hardware and nonhardware information with sufficient reliability and credibility to inform commercial utilization decisions.'" Last, the most extensive empirical study to date of demonstrations referred to "activities undertaken at sufficient scale so that results can be easily translated into regular commercial operations" and distinguished this from pilot plant and field test activities that "involve operation on a smaller scale to determine technical feasibility, to identify major problem areas, and to provide early estimates of costs. "8

The various usages of demonstrations reflect semantic ambiguity about the term. There are, however, two principal meanings that underlie most discussions. The first is that demonstrations are intended to *prove: to* test, validate, and prove the innovation under consideration. The second is that demonstrations are intended to show others the relative advantages of an in-

'Walter S. Baer, Leland L. Johnson, and Edward W. Merrow, Analysis of Federally Funded Demonstration Projects: Final Report, The RAND Corporation, R- 1926 -DOC, April 1976, p. 2. Hereafter, this study will be cited as Federal Demonstrations. A supplementary volume of case studies is Waker Baer, C. Johnston Conover, Cheryl Cook, Patricia Fleischauer, Bruce Goeller, William Hederman, Leland Johnson, Edward Merrow, Richard Rettig, and John Wirt, Analysis of Federally Funded Demonstration Projects: Supporting Case Studies, The RAND Corporation, R-1927-DOC, April 1976. This volume will be cited as Federal Demonstrations: Case Studies.

'See Walter S. Baer, Leland L. Johnson, and Edward W. Merrow, "Government-Sponsored Demonstrations of New Technologies." Science, Vol. 196, May 27, 1977, p. 951.

[3]See the Report of the Study Committee on Social R&D, The Federal investment in Knowledge of Social Problems, The National Academy of Science, Washington, D. C., forthcoming, 1977.

'Martin Rein, Social Policy: Issues oj Choice and Change, Random House, New York, 1970.

'Walter Williams, Social Policy Research and Analysis: The Experience in the Federal SoCml Agenc~es, American Elsevier Publishing Company, New York, 1971, pp. 53-54.

'The Federal Investment in Knowledge o) Socia) Problems, op. cit.

'Don E. Kash et al , Our Energy Future, The University of Oklahoma Press, Norman, Okla., 1976, p. 25

'Federal Demonstrations, p. 19.

novation for the purpose of persuading them to use it. Incorporating both these meanings into our analysis, we have adopted the following definition:

> A demonstration is a project, involving an innovation and operated at or near full scale in a realistic environlnent, for the purpose of (1) formulating national policy or (2) promoting the use of the innovation.

The term "innovation, " as used in this study, may refer to a new program, product, or process. The "use of an innovation" in our definition encompasses the stages of adoption, implementation, and incorporation.

The ways that Congress has provided statutory authorization for demonstrations indicate the range of their intended uses. Frequently, a broad authorization for R&D activity, without specific reference to demonstrations, has provided the basis for agency demonstration projects. The Maritime Administration, for example, has conducted its ship development and construction demonstration program under authority to conduct "research and development activities. " A second pattern has been congressional authorization of demonstrations for which the objectives have been broadly defined. The Bureau for Education of the Handicapped, for instance, has broad authority to support "demonstrations relating to education of handicapped children" and "demonstrations relating to physical education or recreation for handicapped children. " Congress has also authorized demonstrations and specified their objectives. The solid waste demonstration authority of the Environmental Protection Agency is for "the development and application of new and improved methods of collecting and disposing of solid waste" as well as "processing and recovering materials and energy from solid waste. " Congress has on occasion provided specific authority for particular demonstration projects. In 1956, for instance, Congress authorized the "construction, outfitting, and preparation for operation . . . of a nuclear-powered ship, " which became the IV. S. Sauannah. Nevertheless, the two primary meanings of proving and of showing are clear, even from these various statutory formulations.[9]

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Vhis material is drawn from an analysis by Christopher J. Conover of The RAND Corporation, "Federal Demonstration Projects: Statutory Language to Fund Demonstration Projects, " prepared for the Federal Demonstrations study.

More important, perhaps, than the absence of clarity about the meaning of demonstrations is that the results of their use have been discouraging. Some of the main conclusions of one recent study, for example, include the following: "demonstration projects have a narrow scope for effective use;" "demonstration projects appear to be weak tools for tackling institutional and organizational barriers to diffusion ;" "large demonstration projects with heavy Federal funding are particularly prone to difficulty. "lo From other sources, come additional criticisms. [1]1 Demonstrations, it is argued, provide little generalized information because they are often characterized by poor research designs. They seldom are replicated beyond their initial sites, nor do they often lead to commercialization. Many conclude that demonstrations provide little additional information that could not be obtained more inexpensively by other means.

Thus, Congress has good reason to be concerned with demonstrations. First, because Congress appropriates funds for demonstrations, the substantial amount of resources invested in them is in itself reason for congressional attention. What is the Federal Government receiving for its money? What might be better alternative uses of these funds? Second, because Congress provides authorization for demonstrations, an understanding of their appropriate uses and limits is needed for informed decisionmaking on new initiatives. Should authorization be broad or specific, providing substantial or limited administrative discretion? Should demonstrations be authorized by themselves or in relation to other policy instruments and tools? Third, because statutory authority is reviewed regularly and performance of programs assessed periodically through the reauthorization and oversight processes, criteria for the review and evaluation of demonstrations can be helpful. When should demonstrations be employed? How should they be managed? What are the most likely predictors of success?

Purposes of This Study

- To develop a conceptual framework for the analysis of demonstration projects.

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'"Federal Demonstrations, pp. v, vi.

"See, for example, Alice M. Rivlin and P. Michael Timpane (eds.), Planned Variation in Education: Should We Giue Up Or Try Harder?, The Brookings Institution, Washington, D. C., 1975.

- To review and synthesize the literature on demonstrations in relation to this conceptual framework.
- To draw out implications of the analysis for congressional action.

Each of these purposes deserves further comment.

Conceptual Framework

Demonstrations, as is indicated above, have been used both with physical technologies and social programs. Yet no study has attempted to analyze hardware and social demonstrations together. One objective of the conceptual framework developed below is to permit the analysis of demonstrations in many policy contexts, including both physical and social technologies. A related objective is to determine whether there are lessons that can be learned from the use of hardware demonstrations that have utility for social demonstrations, and *uice uersa.* Last, an objective of this study has been to understand the contribution of demonstrations to the different stages of the policy process by distinguishing between those that generate information useful for formulating national policy and those undertaken for the purpose of promoting the utilization of a technology.

Review of the Literature

The literature that constitutes the basis for this study is indicated in the bibliography. It falls into four principal categories. First, there are two studies that focus directly upon demonstrations as policy instruments, both done by the RAND Corporation. One of these is the Federal *Demonstrations* study, cited above, performed for the Department of Commerce. The other is the "change agent" study of educational demonstrations conducted by Berman and McLaughlin for the Office of Education. 12 The second category of literature consists of two retrospective analyses of specific social experiments, both sponsored by The Brookings Institution. '3 One, by Pechman and Timpane, reviews the New Jersey negative income tax experiment. 14 The other, by Rivlin and Timpane, reviews the experience with planned variation in education. 15 Third, there is a general literature on R&D utilization and commercialization that is relevant to demonstrations but in an indirect way. The forthcoming NAS report on social R&D is a case of this type. 16 Finally, there are prescriptive analyses of R&D issues. The analysis by Kash, et al., of U.S. energy options illustrates this type of analysis. 1. In this report, we draw upon the literature to support or challenge propositions that emerge from our conceptual framework. Thus, this study is not a conventional literature review but an analytical interpretation and extension of the literature.

Guidelines for Congress

Previous studies of demonstrations have directed their policy recommendations primarily to the Federal agencies sponsoring demonstrations. Congress, however, has responsibilities for the authorization of demonstrations, appropriation of funds to support them, and review and evaluation of program performance. An important purpose of this study, then, is to analyze the literature and experience of demonstrations in the context of congressional concerns.

"See Paul Berman and Milbrey Wallin McLaughlin et al., Federal Programs Supporting Education Change, Vols. l-V, The RAND Corporation, R-1589 l-HEW, September 1974 and R 1589 2-5-HEW, April 1975,

'[3] For the purposes of this study, we do not distinguish between social experiments and social demonstrations. The major difference between these two types of projects lies in the nature of the evaluation by which the effects are determined rather than in the fundamental purposes they serve. See Henry W. Riecken and Robert F. Borouch (eds.), Social Experimentation: A Method for Planning and Evaluating Social lnteruention, Academic Press, New York, 1974, chapter 1.

'*Joseph A. Pechman and P. Michael Timpane (eds.), Work incentives and Income Guarantees: The New Jersey Negatiue Income Tax Experiment, The Brookings Institution, Washington, D. C., 1975.

"Alice M. Rivlin and P. Michael Timpane (eds.), Planned Variation in Education: Should We Give Up Or Try Harder?, The Brookings Institution, Washington. D. C., 1975,

"See also Arthur D. Little, Inc., Federal Funding of Civilian Research and Development, Volume 1: Summary, Washington, D. C., February 1976.

"Don E. Kash et al., Our Energy Future, University of Oklahoma Press, Norman, Okla., 1976.

Format of the Study

Chapter 11 includes a brief overview of the historical context from which demonstrations have evolved. Chapter 111 develops a conceptual framework for analyzing policies for using demonstrations. This framework is used in chapter IV to develop several propositions concerning factors likely to affect the success of demonstrations. In the concluding chapter, chapter V, we trace the implications of the analysis for Congress.

As this report will make clear, experience and the research literature provide no infallible guides to good policy concerning demonstrations. Problems that arise from using demonstrations are the result of the institutional complexity of the public and private sectors and the workings of a democratic government. We hope that a treatment of this complexity will be helpful to Congress and others for future action.