

Citizen Participation and Judgment in Policy Analysis: A Case Study of Urban Air Quality Policy

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ABSTRACT

The emphasis currently placed on citizen participation in planning results in part from the recognition that planning requires judgments that have both value and technical components. This article describes a case study of a citizen participation process in which planners' judgments, rather than the judgments of the members of a citizens' task force, seemed to dictate the outcome. Although citizens were supposed to be influential in the policy analysis, they were, in effect, excluded from a meaningful role in the process. The analysis was actually guided by planners' supposedly technical judgments. Those judgments had important value implications, however, and those implications were not made clear to the citizens' task force. Examples are given of judgments made by planners at each stage of the analysis and the value components of those judgments are discussed. In each example, the judgments resulted in elimination of alternatives, selection of information, or integration of information. Two examples of methods of citizen participation which can increase the influence of citizens' judgments are also described.

Introduction

Despite debate in the literature of planning, political science, and public administration about the desirability and effectiveness of public participation, its importance in

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planning is now firmly established. In many areas of planning, public participation is required by statute or regulation. Virtually every planning process includes a citizen participation component and often this component consumes significant time, effort, and money. The question of practical relevance to planners and policy analysts now is not *whether* citizens should participate in planning, but rather *how* their participation can best be used to improve both the process and product of policy making.

The goals of citizen participation can range from simply meeting legal and procedural requirements to giving citizens control over critical decisions. This article is concerned with one of the principal goals of citizen participation – improving the responsiveness of the planning process to citizens' values (Verba, 1969: 131; Kahn, 1969: 116; Jordan et al., 1976: 6; McAllister, 1980: 236). We describe a case study of a citizen participation process in which, despite formal public involvement procedures, this goal was not achieved. The citizen participation process afforded little opportunity for citizens to influence decisionmaking.

Problems of implementing public participation have been attributed to many factors, including commitment, power, communication, information, procedures, timing, trust, resources, representation, interest, and knowledge (e.g., Arnstein, 1969; Cupps, 1977; Forester, 1982; Aron, 1979; Abrams and Primack, 1980; Verba, 1969; Wildavsky, 1979; Ingram and Ullery, 1977). Although many of these factors could be applied to the case described in this article, we examine in detail a source that is often overlooked – the judgments implicit in the planners' "technical" analysis. The results of any analysis are strongly influenced by judgments that involve both technical and value components. Technical components focus on the feasibility of meeting certain objectives (Majone, 1975). Value components focus on the desirability of meeting certain objectives.

In this case, judgments made by planners had a major impact on the policy analysis and the results of that analysis determined the final decision. Citizens had little opportunity for meaningful expression of their own judgments and lacked the expertise to recognize and critically evaluate the planners' judgments. The problem was not that the planners made judgments, which is an inevitable part of their craft (Kahn, 1969; Wildavsky, 1973, 1979; Lindblom, 1968), but that those judgments were embedded in an analysis of alternative plans that purported to be objective and that the value implications of those judgments were not made explicit. As a result, the public could not examine the justifications for or the implications of important judgments.

We will describe the policy problem and then discuss the planners' implicit judgments at each stage of the analysis of alternative plans and the way that those value judgments limited the opportunity of citizens for meaningful participation. Finally, we present two examples of processes which did allow citizens' judgments to influence technically complex plans.

Method

This article describes a case study of an urban air quality planning process. The “scene” (Masser, 1982) is limited to the work of a citizens’ task force during a two-year period. The authors observed all meetings of the task force, interviewed planners and task force members, and reviewed all relevant public documents. In addition, an independent consultant attended task force meetings, reviewed documents, interviewed the major participants, and prepared a report on the process (Coe, 1982). The case study is based on the authors’ observations, public documents, interviews, and the consultant report.

Since, in spite of all efforts to the contrary, researchers’ values may threaten the objectivity of case studies of this type, the reader should be aware of the authors’ relation to the process being described. Early in the process the authors offered to provide, at no charge, technical assistance to the task force as part of the authors’ research project on improving technically complex policy decisions. The assistance offered included (a) a computer model which would predict the impacts, over time, of policy alternatives, and (b) systematic procedures, based on judgment theory and decision analysis, for exploring values and tradeoffs (see Dennis et al., 1983). Although many members of the task force were skeptical of the need for assistance in exploring values and tradeoffs, the task force did not reject the offer. However, after considering the offer, the staff of the agency in charge of planning declined it because they felt it might prolong the process and divert staff time from other important planning activities. The authors accepted the staff’s judgment and withdrew the offer to aid the task force. Our focus changed from providing policy assistance to studying the policy process.

The Policy Problem: Denver’s Air Quality

Denver does not meet federal ambient air quality standards for ozone and carbon monoxide. Motor vehicle use accounts for more than 90 percent of these pollutants. Under policies in effect at the time of the study, including the 1977 Clean Air Act auto emissions standards and the Colorado motor vehicle inspection and maintenance program, Denver was not expected to attain federal ambient air quality standards for carbon monoxide by 1987, as required by the Clean Air Act.

According to the Clean Air Act, states must submit to the Environmental Protection Agency (EPA) a plan, called the State Implementation Plan (SIP), showing air pollution control strategies will be adopted in non-attainment areas such as Denver in order to achieve attainment of federal ambient air quality standards by 1987. Potential strategies include both transportation system management strategies (e.g., improved public transport, staggered work hours) and emission control strategies (e.g., motor vehicle inspection and maintenance programs, retrofit of emission control devices). Preparation of the Denver regional element of the Colorado SIP was the responsibility of the Denver Regional Council of Governments (DRCOG).

Citizen Participation

Public participation is required by EPA in all phases of the air quality planning process. The method by participation is not specified, but EPA reviews the public participation plan proposed by the local region. In the Denver region, participation consisted of (a) the formation of a citizens' task force, (b) public workshops to discuss air quality issues, and (c) public hearings on the proposed SIP. The work of the citizens' task force was the centerpiece of the public involvement program and provided the greatest potential for citizens to influence the outcome of the process. The citizens' task force, called the Clean Air Task Force (CATF), was composed of representatives of the state legislature (2), local governments (3), neighborhood organizations (2), office of the Governor (1), environmental groups (2), commerce and industry (5), organized labor (1), and the League of Women Voters (1).

The CATF was appointed by the governor and DRCOG and charged with the task of advising DRCOG with regard to the strategies to be included in the SIP. The CATF was intended to serve as "a broadly based forum for community involvement in the Denver Region SIP element" and would "participate in all aspects of implementation plan development" [1]. The CATF was intended to "function as an on-going working group" and to "serve as a 'sounding board' for reactions to and recommendations on the control measures and other elements considered for inclusion in the Denver Region SIP element" [2]. It is also stated, however, that the CATF "will *develop* the Denver Region element of the State Air Quality Implementation Plan (emphasis added)" [3]. This suggests a more active and comprehensive role than a "sounding board."

The development and review process for the Denver element of the SIP is summarized in Fig. 1. Technical information for the CATF was provided by the DRCOG planning staff, with the aid of the state health department's Air Pollution Control Division. The DRCOG staff also prepared CATF agenda and minutes, planned the technical studies of transportation control measures, designed the procedure for evaluating transportation control measures for inclusion in the SIP, and wrote the draft SIP.

CATF made recommendations to the governing board of DRCOG, and all recommendations that affected transportation systems were subject to approval by a transportation policy committee of DRCOG. DRCOG had to submit the Denver element of the SIP to the state Air Quality Control Commission which could delete or add strategies before passing the SIP to the Governor for final submission to EPA.

Thus, the CATF was comprised of government, business, and community representatives, and was given a somewhat ambiguous role in producing recommendations that were then subject to several levels of review. CATF members knew that their recommendations could be rejected by the DRCOG Board and that their power was limited. However, they did expect to have an active role in developing recommendations. The CATF recommendations were based on the analysis of alternative air pollution

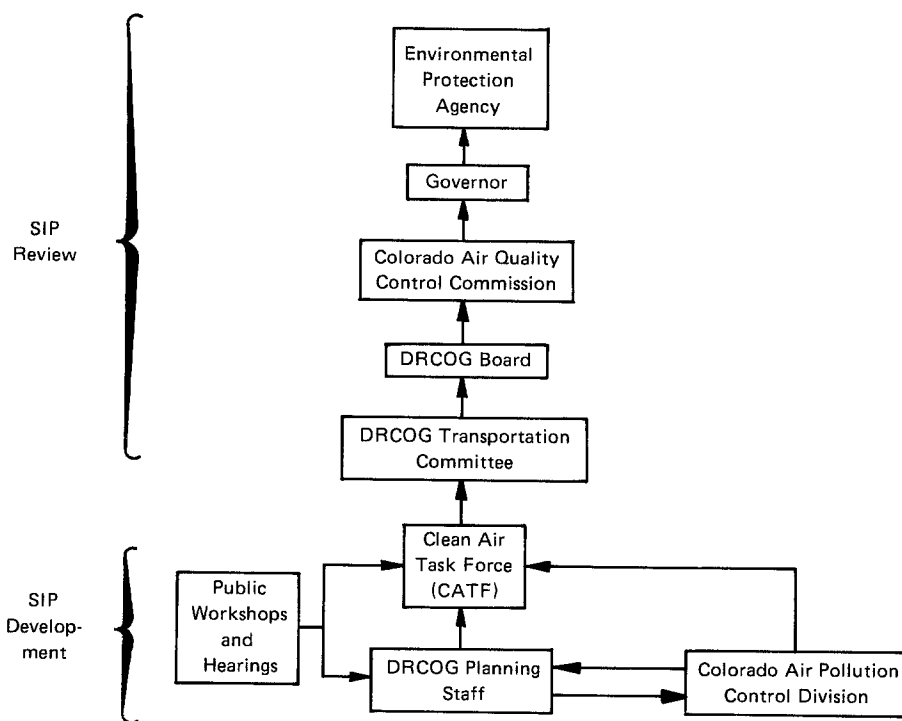


Fig. 1. State Implementation Plan for air quality (SIP): Summary of development and review process.

control strategies which was conducted for the CATF by the DRCOG planning staff. The following section describes some of the critical judgments made in that analysis and the roles of the planners and the CATF in making those judgments.

Judgments in Policy Analysis

Judgments were made during each of the four stages of the analysis of alternative strategies: problem formulation, structuring the analysis, assessing the impacts of alternative strategies, and integrating information into an overall evaluation.

Problem Formulation

Problem formulation is generally recognized as one of the most important aspects of planning (Kahn, 1969: 68-70; Rittel and Webber, 1973). In this case, the problem could have been formulated at least two different ways: (1) What is the best way for Denver to meet federal standards? (2) What is the best air quality management policy for Denver? The choice between the two questions has a significant effect on the analysis.

The first question accepts as a constraint the mandate from EPA to meet federal ambient air quality standards for pollutants that affect human health. If federal ambient air quality standards are treated as an absolute constraint, then packages of strategies that do not meet health standards are not considered. All alternative packages that are considered will then have the same effect on health. Therefore health effects can be ignored in the comparison of alternatives because an analyst does not have to consider factors that do not vary across the alternatives. Only the social and economic impacts of the strategies used to improve air quality need be analyzed, not the health effects of air quality.

The second question admits the possibility of not meeting federal standards. Some alternative packages of strategies to be considered under this formulation may result in levels of air quality that do not meet standards, and therefore the health effects of air quality must be considered. Analysis based on the first question does not, therefore, supply the information needed to address the second.

In our interviews with planners and CATF members, we found that some people thought about the problem in terms of question 1 while others thought in terms of question 2, despite their knowledge of federal requirements. The planning staff, however, formulated the problem in terms of the first question and carried out its analysis accordingly. At the time, this formulation seemed obvious and non-controversial because the federal law and EPA regulations clearly require Denver to meet federal standards. The planners were therefore justified in treating federal air quality standards as an absolute constraint rather than as a criterion to be traded off against other criteria. The formulation seemed to be one that had already been decided upon by Congress and EPA; therefore, it seemed that the planners' judgment was not involved. The CATF was not directly involved in problem formulation.

The formulation proved to be inappropriate, however, because the DRCOG board eventually decided upon a SIP which it admitted would *not* attain federal standards by 1987. Values and beliefs may have changed during the nearly two years between the time that analysis was planned and the time of the final decision. The analysis was guided by the original formulation, however, and so all the analysis was conducted under the assumption that standards would be attained.

The inconsistency between the analysis and the eventual decision had profound value implications. By deciding not to try to meet health standards, DRCOG implied that the health effects of pollution are outweighed by the costs of meeting standards. Although this conclusion may have been consistent with values and beliefs existing at the time of the decision, it cannot be supported by the analysis because health effects were not analyzed. Thus, public health, the very value that the Clean Air Act was designed to assure, may have been threatened by making a decision that was outside the bounds of the original problem formulation.

Structuring the Analysis

Structuring is the process of designing a framework which organizes and guides the work of analysis. In this case, the structure of the analysis was determined by the alternative strategies identified and by the criteria and measures chosen for evaluation of the alternatives. Each will be discussed in turn.

Identification of alternative strategies. Since an inspection and maintenance program had already been adopted for Denver, the CATF focused primarily on additional transportation system management strategies that could be used to improve air quality. The method for identifying these additional measures was described by DRCOG staff as follows:

The development of a package of reasonably available transportation controls began with the preparation of a list of all possible transportation controls. This was developed from a survey of strategies used or considered in the SIPs of other states supplemented by other controls suggested by Clean Air Task Force members and the general public. Next, the level of application for each control was defined so as to be as ambitious as practicable (DRCOG, 1982a: 4).

Thus, the role of the CATF and the general public was to suggest additional strategies for consideration. However, the list of strategies that were eventually analyzed was not exhaustive; the number of strategies retained for detailed analysis was necessarily reduced to a small subset of the possible alternative strategies in order to keep the analysis manageable. This reduction was done by the planning staff.

The principal means for reducing the number of alternatives was the definition of a “level of application” for each strategy. The list of possible transportation controls included general strategies such as “improved public transport” or “bicycle programs” that could not be analyzed because they actually represent families of strategies or programs. For example, “improved public transport” could include programs ranging from adding a few extra bus lines to development of a light rail system. Obviously, the impacts of such programs would be quite different. The term “level of application” was used by DRCOG to describe specific control strategies derived from generic categories. For public transport, the level of application included a free fare zone in the central business district, a 20 percent increase in peak period service frequency, and several other improvements in bus service (DRCOG, 1982a: 34).

The planning staff treated the assignment of levels of application as primarily a technical task. Although the results were presented to the CATF for approval, there was little discussion of levels of application and they were left essentially unchanged.

Any reduction in the number of alternatives considered, whether accomplished by assigning levels of application or by other means, necessarily involves values and therefore deserves careful public scrutiny. An alternative eliminated at an early stage of analysis is lost, even though it might have been better than some which are eventually selected. The value component of the decision to reduce the number of strategies to be considered is illustrated by the statement in the above quote that the

levels of application were defined “so as to be as ambitious as practicable.” This implies a tradeoff between criteria of “ambition,” i.e., effectiveness, and “practicality.” How exactly were ambition and practicality determined? Which criterion dominated when the two were in conflict? Whose values influenced the tradeoffs between them? Since the planners’ decision process was implicit, these questions cannot be answered.

Selection of criteria and measures. The selection of criteria and measures for evaluating alternatives affects every subsequent stage of the analysis. The planning staff used three criteria for the evaluation of alternative strategies: 1) government cost, 2) effectiveness in reducing emissions, and 3) socioeconomic impacts. The measure of government cost was the direct cost of implementing and maintaining the alternative strategies. Indirect costs were not considered (DRCOG, 1982a: 57). The effectiveness of the strategy in reducing health-related emissions was measured in tons per day of carbon monoxide. Several measures were used to define socioeconomic impacts. They included business and transportation user costs, travel time, travel opportunity, low-income, elderly and handicapped service, safety, and miscellaneous impacts (DRCOG, 1982a: 66).

The selection of criteria and measures involved not only the largely technical determination of what the alternatives would accomplish and what their impacts might be, but also the largely value-based determination of what impacts are important. For example, the planners made the judgment that indirect costs should not be counted, an important decision that was made with little citizen consultation and for which little justification was given.

Responses to a questionnaire that the authors distributed to CATF members indicated that they did not consider that the DRCOG criteria necessarily included all important impacts. For example, several respondents to the questionnaire indicated that the effect on “visual air quality” would be an important criterion for evaluating air pollution-control strategies. Even though the Clean Air Act does not consider urban visual air quality, it might have been considered in the analysis as a positive social impact.

The planners could have encouraged the CATF to participate in the selection of criteria, and could have suggested alternative criteria for them to consider. This would have given CATF members more control over the selection of the criteria. Instead, the planners chose what they surely felt were logical criteria with little CATF involvement.

Assessing the Impacts

Once the measures are defined, the assessment of impacts is often considered a technical process. This may have been the case for assessment of costs and emission reductions. The cost of a strategy was estimated by the agency that would be responsible for the strategy. Emissions reductions were estimated by use of a “sketch planning” model of the transportation system which was developed by Cambridge Systematics, Inc. (DRCOG, 1982a: 90). However, there was a strong value component in at least

(MEASURES) Action	IMPACTS						Transp User Cost	Travel Time	Travel Opportunity	Low Income Service	E & H Safety	Miscellaneous Explanation of Miscellaneous
	Business Cost	- former user	- new user	- other user	former user	- new user						
Regulations Prohibiting Vehicles from Idling More than One Minute		○										● Not possible to effectively enforce
Eliminate Drive Through Facilities	●				●					●		
(EPISODIC VEHICLE CONTROL)												
Ban Vehicle Use on High Pollution Days	●	○		○	●		○	●	●	○	●	RTD difficulty in serving greatly increased demand
(OTHER)												
State Subsidy for Vanpool Insurance & Operating Costs	○		○		●		○	○		○		
Gas Tax Increase	●	●						●	●			
Retail Closing of at Least Two Days per Week	●										●	Increase in unemployment
Increase Legal Driving Age Above 18	●			○			○	●	●	○	●	Teenage lifestyles severely restricted
Mandatory Vehicle Occupancy Rate	●	●		●			●	●	●	○	●	Not possible to effectively enforce

Key Magnitude of Impact
○ Very Positive
○ Positive
○ Insignificant
● Negative
● Very Negative

Fig. 2. Socioeconomic impacts of air pollution control strategies. (Excerpted from Table 11 in DRCOG, 1982a.)

one task – the assessment of socioeconomic impact. Figure 2 is an excerpt from a summary of socioeconomic impacts which was presented to the CATF. The assessment of socioeconomic impact involves the aggregation of specific impacts into an estimate of overall impact. This requires comparing qualitatively different impacts and making judgments about the relative importance of the impacts. For example, the impacts of a “no-drive” day are described as follows:

The implementation of *restrictions on private motor vehicle use* would severely restrict the travel opportunities of all area citizens including low income, elderly, and handicapped citizens. Those automobile users who are affected by this plan would have to divert to other transportation modes, resulting in increased travel time and lower transportation costs. Those automobile users not affected by this action would experience reduced congestion of the highways, resulting in reductions in travel time and transportation user costs. Safety would be improved as a result of removing 20 percent of the automobile travel from the roadways. As a result of reduced travel opportunities, there would be some

loss in revenue to retail businesses. Finally, the increased demand for transit service would result in the inability of the Regional Transportation District (RTD) to accommodate travel demand (DRCOG, 1982a: 86).

Both positive (e.g., reduced transportation costs, increased safety, reduced traffic congestion) and negative (e.g., restricted travel opportunities, increased travel time, lost revenue to retail business) impacts are listed, yet the strategy was classified as having “very negative socioeconomic impacts” (see Fig. 3). The judgment that a set of qualitatively different impacts, some positive and some negative, constitutes a “very negative” total impact is clearly a value-laden judgment. Various segments of the public could be expected to, and did, question this assessment on value, not technical, grounds. For example, one speaker at a public hearing stated that he would prefer the social impacts of a no-drive day to the social impacts of air pollution.

Estimation of socioeconomic impacts, which dominated the selection of strategies, was essentially an exercise of staff judgment. According to DRCOG, the social impacts “were assessed qualitatively since the nature of many social impacts (e.g., low-income and elderly and handicapped mobility) does not lend itself to meaningful quantification, and the data base for quantifying other social impacts (i.e., cost to businesses and safety impacts) is not available” (DRCOG, 1982a: 57). The planning staff sent a questionnaire to CATF members asking for their perceptions of socioeconomic impacts. A compilation of the responses of nine members who returned the questionnaire was distributed and discussed at a CATF meeting. The staff generated a list of socioeconomic impacts based in part on input from public workshops and CATF input. Their draft report to the CATF stated that

Comments from the affected transportation agencies, the Clean Air Task Force, and public meetings were included in this document to ensure the comprehensiveness of this section. Consensus of the widely divergent perceptions of socioeconomic impacts was not possible, although an attempt to arrive at a consensus was made. Therefore, it should be noted that this document, in the final analysis, is a product of the DRCOG staff [4].

Such a subjective process would clearly be unacceptable in regard to cost estimates or emission reduction estimates. Ideally, for cost and emission reduction estimates the staff can cite data sources and computational methods or computer models which can be examined and evaluated by competent experts. No one can examine or evaluate the judgment process that led to the staff’s estimates of socioeconomic impacts.

Integrating Information into an Overall Evaluation

Once the separate impacts of the alternatives are assessed, they must be integrated into an overall evaluation which is the basis for choosing one alternative over another. In the case studied, the staff used a cost-effectiveness ratio to combine the cost and effectiveness (in reducing carbon monoxide emissions) of each strategy. The decision to combine cost and effectiveness into a single ratio deserves careful scrutiny because

two alternatives with equal cost effectiveness would not necessarily be evaluated equally with respect to cost and to effectiveness by everyone, regardless of their values. For example, a program of improved traffic flow through signalization has a cost effectiveness of \$45 per ton of carbon monoxide reduced. A program of banning vehicle use on high pollution days has a cost effectiveness of \$43. By the cost-effectiveness criterion, these two strategies are almost equal, yet they differ dramatically with regard to both cost and effectiveness, as shown in Table 1.

Information about the magnitude of both cost and effectiveness is lost in the cost-effectiveness calculation. The cost-effectiveness figures do not show that the ban on vehicle use on high pollution days provides the emission reduction needed to meet federal standards, while the primary signal projects make a relatively insignificant contribution. This information could be important to someone who was primarily concerned with reducing emissions, and might provide grounds for strongly favoring the ban on vehicle use. On the other hand, a person primarily concerned with the costs of implementing strategies might oppose the vehicle ban option on grounds of cost.

Figure 3 is the staff's summary of the cost-effectiveness and socioeconomic impact of the strategies. This chart made it clear to the CATF which strategies were considered to be most cost-effective and to have the least negative socioeconomic impact. The strategies recommended by the staff were adopted by the CATF.

Figure 3 describes how cost, emission reduction, and socioeconomic impact were used to arrive at recommendations. What is not made explicit in the DRCOG analysis is why cost is *divided* by emission reduction (rather than, say, forming a weighted sum of total cost and total emission reduction) and why strategies with very negative

Table 1
Cost, Effectiveness and Cost Effectiveness of Two Strategies*

Strategy	Total government cost per day	Daily effectiveness (Carbon monoxide reduction in tons)**	Cost effectiveness
Primary signal projects	\$402	9.0	44.7
Ban vehicle use on high pollution days	\$12,000	277.2	43.3

* All numbers in this table are taken from DRCOG (1982a)

** It was estimated that a reduction of about 250 tons per day of carbon monoxide would be required to meet the 9.0 ppm eight-hour carbon monoxide standard by 1987 (DRCOG, 1982d: 43).

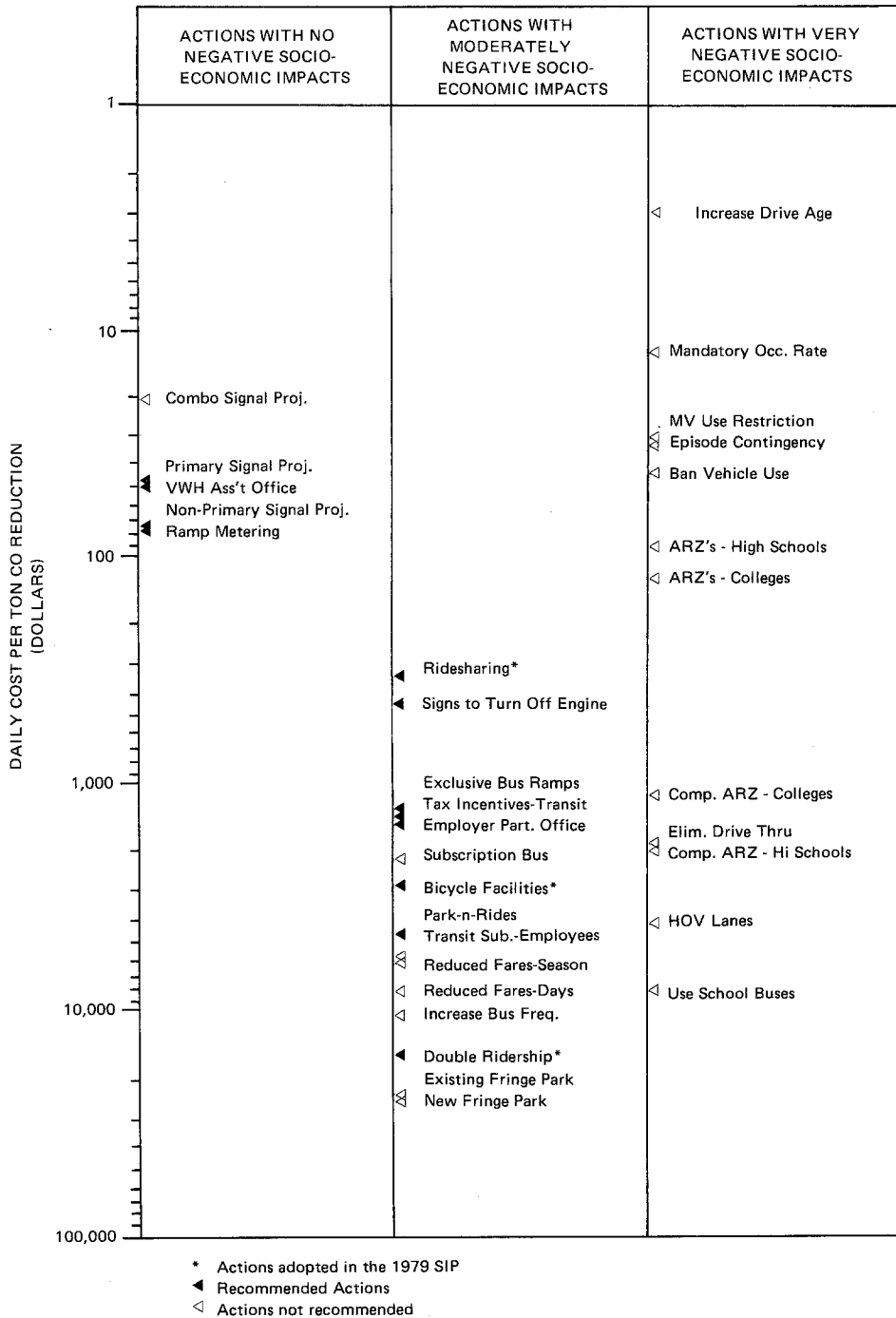


Fig. 3. Graphic representation of cost-effectiveness of SIP actions. (Source: Table 1 in DRCOG, 1982a.)

socioeconomic impacts are considered unacceptable, regardless of their effectiveness.

If the planners had made the evaluation process explicit, then the CATF would have had an opportunity to identify and critically examine the assumptions and judgments made. The staff could also have given the CATF responsibility for developing an explicit evaluation process. This would have assured that the CATF influenced the critical judgments involved in evaluating strategies. The use of methods for developing an explicit evaluation process (e.g., those described by Hammond et al., 1975; Stewart and Gelberd, 1976; Keeney and Raiffa, 1976; and Gardiner and Edwards, 1975) was specifically rejected by the DRCOG staff, citing a lack of time.

Public Input, Political Climate, and the Adopted Plan

The analysis described above took place in a political climate that strongly discouraged any restrictions on automobile use (Kinstlinger, 1979). The placement of all auto restriction strategies in the “very negative socioeconomic impact” category (Fig. 3) reflects this climate. No strategy in this category was recommended for the draft SIP, even though it was recognized that such strategies would be necessary to attain federal ambient air quality standards [5]. In presentations of preliminary SIP recommendations to the public it was stated that “socioeconomic impacts” outweigh “air quality” [6].

This conclusion was disputed, however, by most of the speakers at three public meetings on the draft SIP. According to DRCOG, citizen input during the hearings “mainly consisted of support for measures to improve air quality” (DRCOG, 1982b).

Differences between the CATF and the planning staff surfaced as the CATF was considering its final recommendations. The National Wildlife Federation (NWF), an environmental group not represented on the CATF, proposed a set of strategies that it argued would be socially acceptable and would attain standards. The presentation of the proposals to the CATF was particularly effective because the proposals were backed by technical analysis by an independent transportation consultant who explained his findings at a CATF meeting.

DRCOG staff told the CATF that they had already considered, and rejected, some proposals on the NWF list and that others would require further study. The CATF requested that the staff conduct a full analysis of the proposals. The staff findings, presented at the next CATF meeting, were largely negative. The NWF strategies were dismissed as ineffective or difficult to implement and administer. Nevertheless, the CATF voted to recommend nearly all items on the NWF list of strategies. The DRCOG board, however, did not include the NWF list in the Denver element of the SIP that it submitted to the Air Quality Control Commission because they were “not reasonably available for implementation or public acceptance” (DRCOG, 1982c). Thus, the citizen-initiated proposals were deleted from the SIP, despite CATF approval. The DRCOG board followed the staff recommendations rather than those of the CATF. Although the DRCOG board, which consists of elected local representatives,

may have acted in the best interests of its constituents, the deletion of citizen-initiated proposals from the SIP attests to the ineffectiveness of the CATF. The resulting draft SIP for the Denver region submitted to the Air Quality Control Commission did not include the strategies necessary to achieve attainment of standards by 1987.

Policy Analysis and Participation

The example illustrates how control of important judgments in policy analysis by technical staff can limit the effectiveness of citizen participation. This was not, of course, the only reason for the ineffectiveness of the CATF in this case. Coe (1982) describes several factors which weakened the CATF, including the structure of the SIP process (Fig. 1), the ambiguity of the charge to the CATF, and the composition of the task force. Their chance to influence the process, however, was through the policy analysis. As we have shown, their influence in the analysis was negligible.

Planners controlled the process by making judgments that depended on values as well as facts and that were not made explicit. Planners stated in interviews that they viewed themselves as disinterested experts making technical decisions (Coe, 1982). Since we had no more access than any other citizens to the planners' judgmental processes, we cannot say whether the planners were aware of the value implications of their judgments.

It is clear that the value implications of the planners' judgments were not explained to the CATF. Typically, the staff consulted the CATF by mailing documents to members prior to meetings and then soliciting comments during the meetings. Usually the staff assumed that the members had read the documents and therefore made no verbal summary of the documents during the meetings (Coe, 1982). Although the results of the staff's analysis were presented to the task force, citizens could not be expected to discover, on their own, the value implications of the decisions made in the analysis. It is particularly difficult for citizens to examine judgments when they are buried in a technical report and cloaked in technical language. In their discussion of the task force as a method of citizen participation, Jordan et al. (1976) observed that "lack of parity in technical expertise between the Task Force members and the agency professionals tends to limit the initiative of the members and may inhibit them from challenging the assumptions *and values* of the agency" (Volume II, p. 173, emphasis added). In this case, the planners did nothing to overcome this inhibition.

Complex technical issues and policy analyses, such as those found in air quality planning, can make it difficult for citizens to participate effectively in planning (Verba, 1969; Abrams and Primack, 1980). A tendency to focus on technical issues, to the virtual exclusion of value issues, puts a premium on scientific expertise and technical evidence and minimizes the role of citizens. Most of the CATF meeting time was devoted to the study of technical matters, such as transportation and air quality modeling and consultant reports on specific strategies. Very little time was devoted to discussion of value issues. Nelkin and Pollak (1979) argue that this pattern is typical of

public participation in technological decisions, and that effective participation requires an open process that gives equal time to social and political concerns.

It is interesting to note the parallels between citizen participation in the development of the Denver regional element of the SIP, conducted in 1980–82, and conclusions drawn about citizen participation in Model Cities programs thirteen years earlier:

In general, citizens are finding it impossible to have a significant impact on the comprehensive planning which is going on. In most cases the . . . planners of existing agencies are carrying out the actual planning with citizens having a peripheral role of watchdog and, ultimately, the “rubber stamp” of the plan generated. In cases where citizens have the direct responsibility for generating program plans, the time period allowed and the independent technical resources being made available to them are not adequate to allow them to do anything more than generate very traditional approaches to the problems they are attempting to solve (Organization for Social and Technical Innovation, 1969, quoted in Arnstein, 1969: 221).

Kahn (1969) emphasizes the importance of understanding the value implications of alternatives and making them “highly visible” (p. 126). Davidoff (1965) stated that the “prospect for future planning is that of a practice which openly invites political and social values to be examined and debated” (p. 331). For that to occur it is clear that planners’ judgments must be made highly visible.

Explicitness and Participation: Two Better Examples

McAllister (1980) describes procedures used by a citizen’s task force on air quality planning in California. The task force approached the complex task of evaluating about 100 alternative strategies for controlling air pollution as follows:

1. Cost and effectiveness information was developed by a consulting firm. (Technical analysis was conducted by independent experts.)
2. The task force “identified ten other impact areas it considered important to the evaluation, including energy, employment, special populations, and safety” (p. 253). (Criteria were selected by the citizens.)
3. Each member rated the impact of each strategy on each of the ten impact areas. (Judgments of socioeconomic impacts were made by the citizens.)
4. Each member made an overall rating of each of the strategies. (Citizens made judgments about the relative magnitudes of the combined impacts of alternative strategies.)
5. After discussing their individual ratings as a group, task force members had an opportunity to revise their ratings. (Citizens were given an opportunity to learn from each other. Since each had been involved in making the ratings and thinking about the alternatives, each was prepared to criticize and learn from the others.)
6. The members voted on each of the strategies. (Votes were based on *citizens’* judgments about tradeoffs among cost, effectiveness, and the ten other impacts.)

McAllister reports that the task force “concluded that this evaluation procedure was very helpful to them in addressing this especially complex task” (p. 254). The major difference between this process and the CATF process was that citizens were given the responsibility for making the critical judgments, rather than being limited to responding to the planners’ judgments. Although McAllister’s brief description does not explain what the planners’ contribution to the process was, what aid was given to the citizens in making their judgments, or whether the results of the voting reflected consensus or an uneasy compromise, the process described suggests a method for meaningful citizen participation that can be used within the traditional task force process.

A similar, but more elaborate, procedure was successfully used in a highly political climate by the Central Arizona Water Control Study (CAWCS) for the evaluation of eight alternative water control plans (U.S. Bureau of Reclamation, 1981). The essential elements of this procedure were:

1. Over 100 stakeholder groups were identified and invited to participate. (Broad participation was solicited.)
2. A set of fourteen factors (e.g., cost, water quality, flood control) was developed in consultation with experts and representatives of various interest areas. (Problem structuring involved both technical experts *and* citizens.)
3. Stakeholder groups aligned with different interests (e.g., recreation concerns, water development concerns, environmental concerns) met separately and developed a set of weights reflecting the relative importance of the factors. (The weights, reflecting the values of the various concerns, were developed by citizens.)
4. Technical experts rated each of the eight alternatives with respect to each factor. (Technical expertise is required to judge the *level*, not the significance, of *specific*, not overall, impacts.)
5. For each stakeholder group, an overall score for each alternative was derived by applying the group’s weights to the expert ratings. Specifically, a weighted sum of the expert ratings on the individual factors was formed by multiplying the weight for a factor by the rating on that factor and summing the result over the fourteen factors. (The evaluation process was explicit.)

The resulting rankings of the eight alternatives for each stakeholder group were compared. The results showed distinct similarities in rankings across diverse stakeholder groups. A few alternatives emerged at the top of the rankings regardless of the values (weights) applied. (For conditions that might explain this result, see Dawes and Corrigan, 1974). One of these alternatives was adopted.

The method used in this study was based on multi-attribute utility theory. (For other similar applications and discussion of some of the methodological and theoretical issues involved, see Nash et al., 1975; Gardiner and Edwards, 1975; Stewart and Gelberd, 1976; Hammond and Adelman, 1976; see also Jones, 1970: 337; Starr and

Zeleny, 1977; McAllister, 1980: 264; for critical views of this procedure.) The study provides an example of how an explicit process can be used to incorporate judgments of both experts and citizens into policy analyses. The major difference between this study and the CATF process is that citizens were actively involved in two critical judgment-based stages of the analysis – selection of criteria and weighting the factors.

The two examples illustrate different approaches to making judgments explicit and incorporating citizens' judgments into planning decisions. In the California air quality example, citizens made the judgments involved in evaluating alternatives. This assures that citizens will take an active role and that planners' judgments cannot dominate the process. Furthermore, the citizens were aided in their judgments by a simple rating technique to help them cope with the complex problem and to provide a focus for discussion. It must be recognized, however, that this is a time-consuming process for the citizens and it places a considerable burden on them to make good judgments about a complicated problem.

In the CAWCS case, the citizens' burden was smaller because they only had to consider the relative importance of the factors. They did not have to study and rate each of the alternatives, as the California task force did. However, this method gives citizens less control over the outcome because their input is limited to weights. In this example, they did not control how those weights were used to obtain an overall evaluation of strategies. The loss of control must be weighed against the opportunity for more people to participate because, from the point of view of the citizen, the procedure was simpler.

Although the methods used in both examples have strengths and weaknesses that could be discussed at length, they are presented here simply to illustrate that methods which increase the explicitness of planning judgments and admit the public to the process have been successfully used in practical settings. Of course, these methods could be used to augment, not to replace, other modes of participation.

Discussion

In the case described, planners controlled the policy analysis by controlling critical judgments. Of course, controlling the policy analysis is not necessarily the same as controlling the policy decision. For highly technical problems, however, it is difficult for decisionmakers to ignore the results of technical analysis. The set of alternative policy decisions that can be defended in the political arena is largely determined by the alternatives that survive the policy analysis and by the information generated during the analysis. At the same time, the information used and alternatives considered during the analysis are influenced by events in the political arena. Politics, values, and policy analysis are inevitably entangled.

Urban air quality policy involves the highly technical relation between transportation and pollution, and EPA mandates that air quality plans must use analysis to demonstrate compliance with federal standards. Therefore, the results of the analysis

of alternative strategies are taken very seriously in the final policy decision. Citizens will have little influence if they simply review the results of the analysis conducted by planners because many alternatives already will have been eliminated. Meaningful citizen participation, then, requires an open policy analysis process.

If analysts and planners were required to involve citizens in every judgment that might affect the outcome of an analysis, however, then analysis, and planning, would grind to a halt. Furthermore, few citizens are willing, or have the ability, to advise planners on every aspect of analysis. An alternative must be found to (a) treating important judgments as technical judgments that are not made explicit for public scrutiny or, on the other extreme, (b) turning the analysis over to a representative, but non-expert, citizen body.

Such an alternative should recognize the importance of judgment in policy analysis and the need for both planners and citizens to make their judgments explicit. Specifically, the basis for weighing different items of information in making a judgment should be made explicit. In the following discussion, we use "weighting" to refer not to a specific analytic procedure but to the general process of "balancing," or attaching importance to, different items of information in making a judgment. The weighting process is implicit in all judgments.

For example, all of the judgments described in the Denver case involved weighting. Each judgment had one or more of the following results: 1) elimination of some alternatives from consideration, 2) selection of information for use in evaluating alternatives, or 3) aggregation of information (Table 2). Each result implies weighting of different items of information:

1. *Eliminating alternatives.* Except in the case of dominated alternatives, i.e., those alternatives that are worse than or equal to another alternative on every dimension, the decision to eliminate an alternative from consideration involves weighting of information about the alternative. This was illustrated in the case study by the

Table 2
Results of Judgments for Each Example in the Case Study

Stage of analysis	Result of judgment		
	Eliminating alternatives	Selecting information	Integrating information
Formulation	x	x	
Structuring			
Alternatives	x		
Criteria and measures		x	
Impact assessment		x	x
Integration			x

assignment of “levels of application” that implicitly weighed the effectiveness of alternatives against their practicality.

2. *Selecting information.* The selection of information to be considered in the analysis is a weighting decision. The information not selected is assigned a zero weight; it can have no effect on the results of the analysis.

3. *Integrating information.* Whenever two or more items of information are integrated, weighting of those items is, implicitly or explicitly, involved. Only in the case of analytical integration of information based on an objective formula (such as computing the area of a region from its linear dimensions) can one be sure that the integration is objective.

Judgment and decision theorists generally recognize that weights are an important component of judgment and that weights are influenced by values (see for example Gardiner and Edwards, 1975; Hammond et al., 1975; and Keeney and Raiffa, 1976). Weights have been found to be correlated with values (Stewart, 1973; Stewart and Steinmann, 1973). Weights, whether explicit or implicit, introduce a value-bias into the analysis, i.e., they tend to be more consistent with some desired outcomes than with others.

Acknowledging that the weights implicit in judgments should be made explicit is a first step in encouraging meaningful public participation in policy analysis. The two “better” examples we described above illustrate possible methods for making the weighting process more explicit and involving citizens in it. It must be recognized at the outset, however, that making the weighting process explicit is difficult because it requires trading off usually incommensurate quantities in the face of uncertainty both about what is feasible and what is desirable in the future. Such tradeoffs are always implicit in the policy process, however, and one of the advantages of making them explicit is that it should encourage careful thought with regard to both value and technical components of judgments (Stewart, 1983).

Resolving the inconsistency between increasing public participation and increasingly technical analysis of policy alternatives requires the effort of both citizens and analysts. Citizens must be willing to spend the time and effort required to develop informed judgments. This aspect of participation has been discussed extensively elsewhere (e.g., Verba, 1969; MacRae, 1973; Wildavsky, 1979). For their part, planners must accept the responsibility for balancing public participation with the need to be responsive to policymakers and to conduct a sound analysis within time and budget constraints. In particular, planners who value public participation must become expert in making judgments explicit.

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Notes

- 1 "Air Quality Implementation Planning in the Denver Region: Joint Determination Agreement," p. 3.
- 2 "Clean Air Task Force: An Advisory Body to the Denver Regional Council of Governments" (attachment "B" to the Joint Determination Agreement).
- 3 "Addendum and changes to the Public Participation Program for 1982 SIP Revision," p. 1.
- 4 Draft report, "Inventory, Analysis, and Evaluation of Transportation Systems Management Actions for Improving Air Quality," distributed to CATF prior to their August 21, 1981 meeting. The last two sentences of this paragraph were deleted from the final report (DRCOG, 1982: 74). In addition, the minutes of the July 29, 1981 CATF meeting show the following exchange subsequent to the presentation of the magnitudes of the socioeconomic impacts by DRCOG staff member Mark Bowman: "Questions were raised on how staff came up with the magnitude of impact shown in Table 4 [our Fig. 2 is excerpted from this table]. Mark Bowman responded that it came from qualitative input received from the public at public meetings and from staff analysis. Kent Hanson and Jerome Nagel [CATF members] felt that to determine the magnitude of impacts the Task Force should have discussed the measures in detail. A discussion ensued on this point with questions on the impacts of several measures being mentioned."
- 5 According to the draft State Implementation Plan, December 1981: "After a thorough examination, the Clean Air Task Force determined there were four alternatives which have the potential to reduce emissions to the desired level [necessary to obtain the eight-hour 9.0 ppm carbon monoxide standard by 1987]. Each of these alternatives has *very significant socioeconomic impacts* and is not recommended for implementation" (emphasis added, p. 36).
6. In the announcement of "Public Meetings on Air Quality," January, 1981, DRCOG states that "to attain the carbon monoxide standard would require some severe measures such as gas rationing, two no-drive days per week, and/ or mandatory vehicle occupancy rates. These measures are not being recommended by the Task Force because of the *major social impacts*" (emphasis added).

References

- Abrams, N. E. and Primack, J. R. (1980). "The public and technological decisions," *Bulletin of the Atomic Scientists*, June, 44-48.
- Arnstein, Sherry R. (1969). "A ladder of citizen participation," *Journal of The American Institute of Planners* 35: 216-224.
- Aron, Joan B. (1979). "Citizen participation at government expense," *Public Administration Review* 39: 477-485.
- Branch, Melville (1978). "Critical unresolved problems of urban planning analysis," *Journal of the American Institute of Planners* 44: 47-59.
- Coe, Barbara A. (1982). "The Denver air quality plan: A policy planning process." Report to the Environmental and Societal Impacts Group, National Center for Atmospheric Research, Boulder, CO.
- Cupps, Stephen D. (1977). "Emerging problems of citizen participation," *Public Administration Review* 37: 478-487.
- Davidoff, Paul (1965). "Advocacy and pluralism in planning," *Journal of the American Institute of Planners* 31: 331-338.
- Dawes, R. M. and Corrigan, B. (1974). "Linear models in decision making," *Psychological Bulletin* 81: 95-106.
- Dennis, R., Stewart, T. R., Middleton, P., Downton, M., Ely, D., and Keeling, C. (1983). "Integration of technical and value issues in air quality policy formation: A case study," *Socio-economic Planning Sciences* 17: 95-108.
- DRCOG (Denver Regional Council of Governments) (1982a). *Inventory, Analysis, and Evaluation of Transportation Systems Management Actions for Improving Air Quality*. February.
- DRCOG (1982b). "Citizen perceptions of air quality and control measures in the Denver region." Report prepared by DRCOG and distributed to CATF on January 27, 1982.
- DRCOG (1982c). *DRCOG Notes*, May 1982, Vol. 15, No. 5, p. 1.
- DRCOG (1982d). *1982 Denver Regional Element of the State Air Quality Implication Plan*. February.

- Forester, J. (1982). "Planning in the face of power," *Journal of the American Planning Association* 48: 67-80.
- Gardiner, P. C., and Edwards, W. (1975). "Public values: Multiattribute-utility measurement for social decision making," in M. F. Kaplan, and S. Schwartz (eds.) *Human Judgment and Decision Processes*. New York: Academic Press.
- Hammond, K. R. and Adelman, L. (1976). "Science, values, and human judgment," *Science* 194: 389-396.
- Hammond, K. R., Stewart, T. R., Brehmer, B., and Steinmann, D. O. (1975). "Social judgment theory," in M. F. Kaplan and S. Schwartz (eds.), *Human Judgment and Decision Processes*. New York: Academic Press.
- Ingram, Helen M. and Ullery, Scott J. (1977). "Public participation in environmental decision-making: Substance or illusion?" in J. T. Coppock and W. R. D. Sewell (eds.), *Public Participation in Planning*. London: Wiley.
- Jones, J. Christopher (1970). *Design Methods*. London: Wiley.
- Jordan, D., Arnstein, S., Gray, J., Metcalf, E., Torrey, W., and Mills, F. (1976). *Effective Citizen Participation in Transportation Planning*. Washington, D.C.: U.S. Department of Transportation, Federal Highway Administration.
- Kahn, A. J. (1969). *Theory and Practice of Social Planning*. New York: Russell Sage Foundation.
- Keeney, R. L. and Raiffa, H. (1976). *Decisions with Multiple Objectives: Preferences and Value Tradeoffs*. New York: Wiley.
- Kinstlinger, Jack (1979). "Institutional factors in the implementation of auto restriction measures." Paper prepared for the Transportation Research Board Annual Meeting, Washington, D.C. January 15.
- Lindblom, C. E. (1968). *The Policy-Making Process*. Englewood Cliffs, New Jersey: Prentice-Hall.
- MacRae, D. Jr. (1973). "Science and the formation of policy in a democracy," *Minerva* 11: 288-242.
- Majone, G. (1975). "The feasibility of social policies," *Policy Sciences* 6: 49-69.
- Masser, I. (1982). "The analysis of planning processes: Some methodological considerations," *Environment and Planning B* 9: 5-14.
- McAllister, D. M. (1980). *Evaluation in Environmental Planning*. Cambridge, Massachusetts: MIT Press.
- Nash, Christopher, Pearce, David and Stanley, John (1975). "Criteria for evaluating project evaluation techniques," *Journal of the American Planning Association* 41: 83-89.
- Nelkin, Dorothy and Pollak, Michael (1979). "Public participation in technological decisions: Reality or grand illusion?" *Technology Review*, pp. 55-63.
- Organization for Social and Technical Innovation (1969). *Six-Month Progress Report to Office of Economic Opportunity, Region I*, February I, pp. 27, 28, and 35.
- Rittel, Horst W. J. and Webber, Melvin M. (1973). "Dilemmas in a general theory of planning," *Policy Sciences* 4: 155-169.
- Starr, Martin K. and Zeleny, Milan (1977). "MCDM-State and future of the arts," *TIMS Studies in the Management Sciences* 6: 5-29.
- Stewart, T. R. (1983). "Visual air quality values: Public input and informed choice," in R. D. Rowe and L. G. G. Chestnut (eds.), *Managing Air Quality and Scenic Resources at National Parks and Wilderness Areas*. Boulder, Colorado: Westview Press.
- Stewart, T. R. (1973). "The linear model in attitude measurement: An example and some comments," *Educational and Psychological Measurement* 33: 285-290.
- Stewart, T. R., and Gelberd, L. (1976). "Analysis of judgment policy: A new approach for citizen participation in planning," *American Institute of Planners Journal* (January) pp. 33-41.
- Stewart, T. R., and Steinmann, Derick O. (1973). "Community goals: A study of relative importance." University of Colorado: Center for Research on Judgment and Policy, Boulder, CO, Report No. 156.
- U.S. Bureau of Reclamation (1981). Central Arizona Water Control Study, Appendix B, Public Values Assessment.
- Verba, S. (1969). "Democratic participation," in B. M. Gross (ed.), *Social Intelligence for America's Future*. Boston: Allyn and Bacon.
- Wildavsky, A. (1973). "If planning is everything, maybe its nothing," *Policy Sciences* 4: 127-153.
- Wildavsky, A. (1979). *Speaking Truth to Power: The Art and Craft of Policy Analysis*. Boston: Little, Brown and Co.