

Kalter, Robert J.

Working Paper

Testimony on Water Resource Evaluation Procedures

Staff Paper, No. SP 69-10

Provided in Cooperation with:

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Suggested Citation: Kalter, Robert J. (1969) : Testimony on Water Resource Evaluation Procedures, Staff Paper, No. SP 69-10, Cornell University, Charles H. Dyson School of Applied Economics and Management, Ithaca, NY, <https://doi.org/10.22004/ag.econ.189155>

This Version is available at:

<https://hdl.handle.net/10419/276302>

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TESTIMONY ON WATER RESOURCE EVALUATION PROCEDURES

BY

Robert J. Kalter

September 1969

No. 10

Testimony Presented to the Water Resources Council Hearing in Washington, D.C., September 10, 1969, on the Report to the Water Resources Council by the Special Task Force entitled "Procedures for Evaluation of Water and Related Land Resource Projects". June, 1969.

Robert J. Kalter
Resource Economist

I am a resident of Ithaca, New York and an assistant professor of resource economics at Cornell University. My qualifications in the area of economic evaluation of public investment include a doctorate in economics from the University of Wisconsin and major responsibility for research and teaching in this field at Cornell University. I appear today as a public witness and as such do not represent any special interest group or other organization.

CRITERIA FOR EVALUATION OF WATER RESOURCE INVESTMENTS

Economic evaluation of proposed water resource investments during the past 30 or more years has centered around the single-valued welfare criterion of national economic efficiency as implemented by benefit-cost analysis techniques. As has been pointed out elsewhere, this is an understandable occurrence.¹ However, as the Task Force report and others have observed, basic objectives in addition to economic efficiency have been recognized as being relevant to the public planning and decision-making process.² Although Senate Document 97 gives official recognition to several of these other

¹Robert J. Kalter et al., "Criteria for Federal Evaluation of Resource Investments," Cornell Water Resources and Marine Sciences Center, Cornell University, Aug. 1969, p. 3.

²Ibid., p. 3-6.

Water Resources Council, "Procedures for Evaluation of Water and Related Land Resource Projects," Report by a Special Task Force (Washington), June 1969.

objectives,³ little effort has gone into perfecting the methodology necessary to obtain quantitative estimates of project effects on those objectives or of properly associating the results of such estimates with the planning process. If we ignore these other components of the social welfare function, the relevance of the planning and evaluation process to actual decision-making is reduced. More explicit recognition of the existence of such a function and, consequently, the need to evaluate proposed projects from the viewpoint of several relevant social objectives is long overdue. I support the tone and direction of the Task Force report in recommending this course of action.

The justification for using multiple objectives when evaluating proposed projects or programs has been summarized in Kalter et al.

Decisions about resource investments affect many diverse interests. The planning process must provide the institutional means and the information flows to permit these varying interests to communicate, bargain with each other, and arrive at mutually acceptable resolutions of potential conflicts.⁴

To do this the information and analytical system must show not only who is affected by a project proposal but by how much in terms of both quantity and quality.

Robert H. Haveman, Water Resource Development and the Public Interest (Nashville: Vanderbilt University Press), 1965.

Stephen A. Marglin, "Objectives of Water-Resource Development: A General Statement," in Design of Water Resource Systems (Cambridge: Harvard University Press), 1962.

³The President's Water Resources Council, Policies, Standards, and Procedures in the Formulation, Evaluation, and Review of Plans for Use and Development of Water and Related Land Resources, 1962, pp. 1-2.

⁴Kalter et al., p. 4.

Basic economic principles serve as the foundation for national economic efficiency analysis which provides one component of the needed information. However, other types of benefits can be illuminated with appropriate economic concepts and, as indicated above, need to be used in public decision-making. These other relevant criteria may include regional economic growth, personal income distribution and considerations such as environmental quality.

As the Task Force points out on page 19:

In order to assure that full consideration be given to each of these objectives, they must be made explicit in operational terms for each plan and project. Concomitantly, the contributions that projects make to these objectives must be measured. . . . By displaying both favorable and adverse project effects on stated national water development and other objectives, a better basis of choice for selecting among alternatives is provided all groups of decision-makers--Federal, State, and local governments, concerned citizen groups, and private enterprise.

A commitment along these lines can do nothing less than stimulate the development and application of methodology necessary to provide more adequate information to public decision-makers and, thereby, improve the overall decision-making process. Moreover, changes in the evaluation procedures applied to proposed water resource investments could have important, and in my view, beneficial ramifications on the evaluation of other public investments. Because of the traditional leadership which economic evaluation of water and related land resource investments has taken, broadening the framework of analysis will make the analytic aspect of the planning-programming-budgeting system more meaningful to public decision-making throughout the Federal government.

A Note on the Social Welfare Function: In supporting the Task Force's recommendations on the matter of multiple criteria, I am not arguing for

evaluation or analysis which will give public decision-makers a "yes-no," "good-bad," "favorable-unfavorable" type of decision on any particular proposal or program. Analysis of a project from the viewpoint of non-efficiency objectives cannot be expected to produce such results. Conceptually, it is not possible to identify a standard of the type associated with the benefit-cost ratio for objectives other than national economic efficiency. This results from the value judgments that are inherently required when attempting to evaluate the effects of changes in such things as personal, regional or sectorial equity.⁵ Specification of numerical weights for alternative objectives and maximization of an overall social welfare function is at best premature and may never be fully realistic for final decision-making.⁶

However, this should not be a deterrent to displaying, quantitatively, the effects of proposed projects from the viewpoint of various objectives. What is needed is a matrix which shows the quantitative effects of various alternatives on given public objectives. With this type of information, the explicit tradeoffs can be made as part of the final decision process. This process, which includes comparison and choice from among concrete alternatives, can be expected to continue as a jealously guarded right of our political process. Thus, what I favor is not an ex-ante specification of social welfare weights for planning purposes but more complete analysis of proposed program effects on individual objectives with final decisions on tradeoffs resting in the hands of higher level decision-makers.

⁵The Task Force recognizes this point on page 68.

⁶Kalter et al., p. 7.

METHODOLOGY FOR EVALUATION OF WATER RESOURCE INVESTMENTS

Agreement with the general rationale for multiple objectives and the policy direction taken by the Task Force report does not necessarily mean that one agrees with all the methodology outlined for implementation. The Task Force report contains serious defects in this area which should be remedied. Two of the principal ones are discussed below.

1. Allocation of Costs Among Objectives

The Task Force indicates on page 29 that: "... benefits and costs have meaning only to the extent that they can be related to objectives..." In view of their recommendation on multiple objectives, they state that the need emerges "to make explicit the evaluation principle of relating benefits to objectives." However, on page 31, the report goes on to point out that the objectives "are not mutually exclusive accounts since benefits that would be assigned to each cannot be added to a grand total of benefits." All of these statements are well taken since projects produce national income gains as well as benefits attributable to other objectives like regional growth and environmental quality. Furthermore, benefits which are counted under one criterion framework may also be applicable to other objectives. For example, certain national income gains of a project can also be gains to a region and should be accounted for under both objectives. Although a given dollar volume of benefits would be counted twice in this case, it is not double counting in the traditional sense because of the conceptual difference in objectives and the resulting fact that benefits accruing to the two accounts cannot be added together to give a "grand total."

The same argument holds true for the cost side of the accounting frameworks. However, the Task Force does not follow this line of reasoning.

On page 57 they state:

The Task Force proposes that national income and other costs required to realize the benefits contributing to a given objective be assigned to that objective under column (2) or (3) of the table. When a plan formulated for maximum net national income is modified to achieve another objective it is proposed that the incremental costs be assigned to the other objective. If the increment also results in additional national income gains these would be entered in the national income account with the reassignment of an equivalent amount of the costs of the increment. Thus, an equal amount would be reassigned to both benefits and costs in the national income account and the benefit-cost ratio in the modified national income account would be a measure of the return in that account. The system would reveal the cost in national income terms of achieving the other objectives.

Again on page 61 they state:

Costs assigned to the national income account will not include costs occurred solely to meet other objectives. Thus, if a project designed for national income purposes is modified to achieve another objective the net costs of such modification as noted above will be assigned to the other objective.

However, to follow this suggestion would destroy the conceptual foundation upon which the analysis of individual objectives rests. All proposed projects will have implications for all of the various objectives. Therefore, project analysis should show the effect of the project on each of the objectives. This can not be accomplished if the Task Force recommendations are carried out. For example, if costs properly included under the national efficiency framework are allocated to other objectives because a project has implications for those objectives, the meaning of the national efficiency analysis would be destroyed. This can be illustrated by a hypothetical example. If a proposed river basin project had a projected present value national efficiency benefit of \$100 and a projected present value national efficiency cost of \$50, the benefit-cost ratio would be 2.0 and the net present value efficiency benefits would be \$50. For simplicity

we will assume no benefits to the regional or other objective accounts. Now assume that an increment of \$25 in national efficiency costs is added to the original proposal for the sole purpose of providing a regional benefit. Further, assume that the actual result of that addition produced \$50 of present value regional benefits but no benefits to other objectives, including national efficiency. The modified plan is in actuality a different alternative from the original plan. It would have the same national efficiency benefits but a \$75 national efficiency cost. The result is a benefit-cost ratio of 1.33 and \$25 of net present value efficiency benefits. However, in addition, \$50 of regional benefits are obtained at a zero cost to the region and a \$25 cost to the nation. The tradeoffs between the two alternatives are made explicit.

If the Task Force recommendations are followed, however, the results of the national efficiency analysis will not differ between the two alternatives--i.e., both would show a 2.0 ratio and \$50 of net benefits. This is obviously not the case because all national costs are not included for the second alternative. Furthermore, the analysis does not show "the cost in national income terms of achieving other objectives." The latter is also a stated goal of the Task Force recommendations but carrying out their recommendations on cost allocation would make it impossible to accomplish as well as rendering the analysis shown in the national efficiency account meaningless. The account would no longer show the national income effects of proposed projects since the analysis would violate the basic principles of economic theory which serve as its foundation. The example could be made more complicated or generalized to cover other objectives but the conclusion would be the same.

The alternative procedure to the Task Force recommendation is clear.

As I have pointed out elsewhere:

. . . a criterion should initially be isolated and all the benefits and costs of an alternative properly accounted for under the criterion should be included. Thus, . . . certain benefits and costs may be included under more than one criterion because they may be applicable to several objectives.⁷

As the Task Force points out on page 58, cost allocation is a complex issue and should be given more study. However, the principles discussed above are clear and should not be in dispute.

2. Consideration of Alternatives

One of the keys to improved analysis using multiple objectives is the proper consideration of alternative courses of action. As the simple example given on cost allocation illustrates, full consideration of the tradeoffs between various objectives and movement towards some sort of optimization over all objectives requires the consideration of relevant alternatives. The Task Force report is deficient in not providing the guidelines necessary for specification of such alternatives and for not discussing the obvious requirements for institutional change.

As Kalter et al. have stated:

Analysis of the scale to which a specific project should be built or a comparison of a specific project with very similar alternatives never has been completely satisfactory and is no longer sufficient when multidimensional objective functions are utilized. A broad range of widely differing alternatives must be examined in a comprehensive economic analysis. In other words, means other than natural resource development must be explored for meeting objectives when natural resources are not a limiting constraint on objective achievement. This requirement may dictate that either the authority of specific agencies be broadened to allow consideration of such alternatives or that some independent body be responsible for assuring this be carried out.⁸

⁷Ibid., pp. 7-8.

⁸Ibid., p. 7.

Moreover, specification and analysis of relevant alternatives is especially critical for another reason when evaluation takes place from the standpoint of multiple objectives. Analysis of alternatives under the national income account may produce Plan A as an optimum plan but Plan A could simultaneously show adverse effects on one or more other objectives. Conversely, Plan B may be socially more desirable under other objective accounts but be less than optimum under the national income account. Thus, a second best plan under any specific account may be the overall optimum when considered from the standpoint of the several objectives. Failure to consider appropriate alternatives or early rejection of alternatives during the planning process will result in choice of programs or projects which do not approach an overall optimum - even though that optimum may be vaguely defined by the political process.

OTHER CONCEPTUAL AND METHODOLOGICAL CONSIDERATIONS

Other points which I consider important to the theoretical underpinning and empirical implementation of public investment evaluation are given in the paper entitled "Criteria for Federal Evaluation of Resource Investments" which I earlier asked be read into the record. These include a discussion of the number of objectives that should be contained within a social welfare function; the distinction between various types of benefits and costs; questions about regional analysis, and about incorporation of risk and uncertainty into evaluation techniques.

Finally, a few general comments should be made on section VI of the report which is entitled "Evaluation Practices and Measurement Techniques." In view of the emphasis placed by this section on the national income objective and taking account of the overwhelming amount of research and

professional work on this topic, this section is by far the least satisfactory of the report. It is conspicuous for what is not covered and for recommending certain changes which are not in accord with theoretical economic principles. Topics not adequately covered in the sub-section on the national income objective include:

1. Use of long-run marginal costs rather than average costs or tariffs in determining benefit values for public goods and services which compete with private market alternatives.
2. Valuation of agricultural benefits by private market prices for commodities whose prices have been inflated by subsidy programs.
3. Comparison of public projects with private alternatives under comparable bases of taxes, insurance and cost of capital.
4. Use of "least cost" and not the "most likely" alternative when comparisons are made with a private alternative.

In addition, the recommendation on pages 76 and 77 that alternative cost concepts be used "as a measure of benefits in the absence (underlining is mine) of competitive market conditions" is clearly wrong and inappropriate. This recommendation permits any project which falls within its scope to be economically justified by definition under the efficiency criterion, without any consideration of such basic economic concepts as supply and demand.

In conclusion, section VI is noticeable for the lack of emphasis placed on methodology for measuring benefits and costs associated with objectives other than national efficiency. Given the emphasis placed on multiple objectives in the first five sections of the report, one is somewhat surprised to find few recommendations for guidance along these lines.

One can only hope that needs in this area will be properly considered in the testing phase which the Task Force has so wisely recommended.

CONCLUDING COMMENTS

As stated in the opening remarks of my testimony, I strongly support the Task Force's recommendations on evaluation through the use of multiple objectives. The critical comments made on the methodology recommended for implementation should not be interpreted as a lessening of my enthusiasm for this proposal. Rather, the comments on methodology are given in the spirit of constructive criticism which the report appears to invite and in view of the following statement made in Kalter et al.

Success in such an undertaking, however, is highly dependent upon the methodologies used for empirical implementation of the conceptual framework. Methodology which is inconsistent with theoretical principles would provide a result which can only be considered a worsening of the current situation rather than improvement.⁹

⁹Ibid., p. 6.