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(1) COST CONSIDERATIONS IN POLICY ANALYSIS

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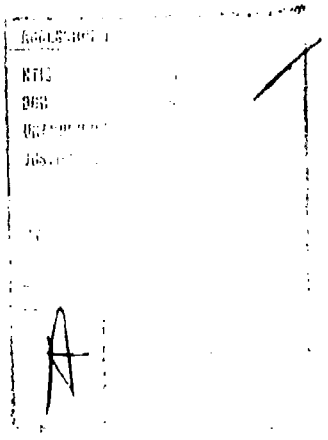

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COST CONSIDERATIONS IN POLICY ANALYSIS*

> Cost is subjective; it exists in the mind of the decision-maker and nowhere else. Cost is based on anticipations; it is necessarily a forward-looking or *ex ante* concept. Cost can never be realized because of the fact of choice itself: that which is given up cannot be enjoyed.**

INTRODUCTION

What are the key issues in cost considerations in policy analysis today? To provide a specific context for raising and discussing some of the more important ones, let us assume that we are part of an interdisciplinary policy analysis team charged with assisting decision-makers in grappling with policy choices regarding alternative regional transportation systems for distances up to 500 miles for the late 1980s and early 1990s. A range of alternative system mixes is to be evaluated in terms of travel time, dollar cost, and some measure of comfort. The specific modes to be considered include evolutionary advances in conventional jet aircraft, advanced STOL and VTOL aircraft, tracked air-cushion land vehicles, autotrains, and others.

If we were "classical" cost analysts, how would we proceed? Most likely somewhat as follows:

1. Obtain definitive technical and operational concept descriptions of each of the alternative system mixes from the system design people.
2. Accumulate as complete a data base as possible about these and similar systems, given the relevant time and budget constraints for the study.

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The author has benefitted from comments by B. D. Bradley, M. W. Hoag, J. E. Koehler, and D. Novick.

**James M. Buchanan, *Cost and Choice*, Markham Publishing Co., Chicago, 1969, p. 43.

3. Develop an inventory of estimating relationships--e.g., functional forms relating key elements of system cost to system performance and other characteristics.
4. Combine the estimating relationships into "models" for estimating the dollar cost of alternative transportation system mixes.
5. Make estimates of the development, investment and operating cost for each of the alternatives considered in the analysis. (We probably would also translate these "system costs" into unit travel costs to potential consumers.)
6. Carry out cost sensitivity analyses for relevant excursions proposed by ourselves or others on the study team.

Even if we did all this very expertly, would it be sufficient? Most probably not, because our study director had formulated a very narrow study design and scope of analysis; one that focused primarily on travel time, dollar travel cost, and some measure of comfort for each of the system alternatives. While such a narrow scope might have been justifiable if insufficient in the past, it certainly would not be adequate in assisting the policy makers in today's (and no doubt the future) environment. This being the case, as responsible cost analysts we should propose to broaden our scope of inquiry.

What might such a broadening involve? Since my time today is limited, let me focus on three major issues.

1. Dollar cost measurements, while necessary and certainly relevant, may not always be sufficient in serving as a proxy for real economic cost--i.e., benefits or opportunities foregone--either because some dollar costs were excluded by too narrow a study design, or because some costs cannot be so measured.
2. Economic costs, even if measured perfectly, are not the only costs (negative benefits) involved in policy issues like the transportation example we are considering. Non-economic costs (e.g., negative "quality of life" impacts) can also be

very important, and only some of them can be reduced to appropriate monetary measurements.

3. Aggregate measurements of economic and non-economic costs, even if done well, may not be sufficient. Policy makers have become increasingly sensitive to the *distribution* of costs (and benefits as well). That is, who will pay and who will receive is often a major consideration.

I shall comment briefly on each of these in turn, and then offer a few remarks on the implications for synthesizing study results for the policy makers.

ECONOMIC COSTS

From economics 1-A we may recall that economic costs are hopelessly intertwined with benefits. An economic cost is a benefit foregone. Hence, the often-heard assertion that we cost analysts on an interdisciplinary study team have an easier time of it than our colleagues who have to struggle with measuring benefits, is necessarily true only if costs are considered too narrowly. Again, from economics 1-A we know that it is only under a very special set of circumstances that monetary measurements (e.g., market prices) are *perfect* reflections of economic cost (benefits foregone).* Particularly in the case of large-scale government programs, dollar costs may not (perhaps never) be a precise measure of economic costs. On the other hand, as Hitch and McKean have pointed out, the more distant the future alternatives are--which permits almost all resources to be substitutable and therefore fungible--the better dollar costs can serve as a rough approximation of economic costs.**

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*E.g., see Chapter 3 and Appendix A of my *Cost Considerations in Systems Analysis*, American Elsevier Publishing Co., Inc., 1971.

**C. J. Hitch and R. McKean, *The Economics of Defense in the Nuclear Age*, Harvard University Press, 1960, pp. 25-26.

Where does all this leave us? Returning to our transportation study example, the cost analysts might consider the following:

1. Certainly, the so-called classical calculations of total dollar system cost (development + investment + operations) should be made. This gives a rough preliminary indication of the economic impact of each of the proposed transportation modes. In the early stages of the analysis, when screening of a large number of alternatives is required, these system cost estimates should usually be done on a "static" basis--i.e., the sum of development, investment and a specified number of years of operation. These unrefined estimates will help to permit the number of alternatives to be reduced to a manageable number for more sophisticated treatment.
2. During the later stages of the policy analysis effort when a "preferred" set of regional transportation alternatives begins to emerge, the static estimates should be converted to time-phased dollar cost streams for each of the alternatives in the set. Since decisionmakers must always be concerned about budgeting matters, these cost streams should be expressed in terms of the budget concept most appropriate to the problem at hand--e.g., obligational authority, expenditures, or whatever. Time-phased estimates are important because they serve as a proxy for the timing of the economic impacts for the various alternatives; and timing is almost always an important consideration in policy decision-making problems.
3. Time-phased estimates also provide the basis for treating the "time preference" problem. Given that the commitment of resources to any transportation alternative will necessarily be at the expense of non-transportation alternatives, and that this expense will be heavier if "near-year" costs loom large relative to "far-year" costs, it follows that all cost streams should ideally be converted to a common present

value measurement by discounting at an appropriate rate to reflect the marginal productivity of capital. But since what rate truly reflects the marginal productivity of capital is indeed very much a matter of controversy, a range of rates should be used to test the sensitivity of outcomes to assumptions about the discount rate. Above all, the cost analysts must be very explicit about their assumptions and not conceal them from the decisionmakers--as has happened so often in the past.*

4. To assist policy makers in making their intuitive judgments about possible "benefits foregone," the cost analysts might try to do the following in the late stages of the analytical process: For the estimated future budget levels for one or two of the preferred alternative regional transportation systems, the cost analysts could make illustrative calculations of what kinds and quantities of gross outputs that might be obtained in *other* areas of regional development. This is not always possible to do; but when it is feasible, it can be quite helpful in policy-making deliberations.

5. As a final comment under the heading of economic costs, I would like to make a general point regarding possible difficulties in cost analysis work. While supply and demand forces in the more distant future are not easy to predict with confidence at the present time, it is possible that we may face rather severe resource scarcity in a number of areas, with resulting sharply rising marginal cost curves. If so, cost analysts will have to be very careful about using estimating relationships based on past and present cost data--especially in the case of very large proposed

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*Very often the analysts have made a single arbitrary assumption and not disclosed it to the decisionmakers. Usually this has been a rate of zero for the time period of interest and infinity thereafter. While this assumption is very useful for certain purposes--e.g., in program budget contexts--it should always be made explicit and alternative assumptions considered as well.

government programs. This in turn means that cost analysts will have to engage in much more extensive and careful economic analyses than has been typical in the past.

The above are examples of the kinds of considerations that cost analysts should think about in dealing with economic costs in policy analysis problems. Let us turn now to other negative benefits, with emphasis on so-called "non-economic" costs.

NON-ECONOMIC COSTS

All too often in the past I think that cost analysts have tended to "pass the buck" when faced with allegedly "non-economic" cost problems. It has been all too easy to say "non-economic costs may be viewed as negative benefits, and hence that the fellows on the study team concerned with estimating benefits of the alternatives under consideration should deal with those problems."* However, very often the analysts dealing with benefits (or "effectiveness") have been very technically oriented, and reluctant to grapple with issues regarded as "external" to the main aspects of the problem at hand. The result of this jurisdictional jockeying has been that non-economic costs have many times fallen through the cracks. With today's concern with numerous "quality of life" issues, policy analysts can no longer afford to ignore negative impacts which were formerly treated as externalities. I suggest that the modern cost analyst should be vitally concerned with these matters and should take initiatives to insure that all relevant indirect negative impacts are taken into account--even if only in a proximate sense.

What can be done? Quite a bit, at least in certain areas. To illustrate, let us return to our transportation example. As indicated previously, conventional transportation analysis has usually concentrated on travel time, dollar travel cost and some measure of comfort. Today, in evaluating alternative future transportation systems, many more factors have to be taken into account.

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*It should be pointed out that *economic* costs are *also* negative benefits--benefits foregone!

For example, many, if not most, transportation systems generate noise--an "external" effect (or non-economic cost) that must now be "internalized" in policy analyses of future transportation alternatives. Methods for doing this have been developed.* These noise impact models permit the calculation of noise exposure contours expressed in appropriate metrics (e.g., noise pollution level, noise exposure forecast, and decibels on the A scale) for alternative air and ground transportation systems. The number of households impacted at critical exposure levels near airports and along ground routes can also be computed.

There are, of course, many other types of impacts of alternative future transportation systems which may take the form of negative benefits; e.g.:

- o Increase in congestion in certain areas
- o Number of households displaced
- o Increase in air pollution emissions.

Methods and techniques have also been developed to permit *internalizing* these factors into the policy analysis process.**

At this point I feel obligated to discuss briefly a point that is somewhat beyond the charter of my paper, but is nevertheless a matter of fundamental importance. It is one thing to find ways to "internalize" external effects in analytical studies in support of deliberations about major policy issues. It is quite another to carry these "internalizations" over to substantive deliberations concerning *implementation strategies*. In considering alternative implementation strategies, a fundamental objective should be to select a strategy which will most effectively harmonize industry's and society's interests. One way to do this is to try to structure the implementation so that incentives will tend to set prices which

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*E.g., see L. G. Chesler and B. F. Goeller, *The STAR Methodology for Short-Haul Transportation: Transportation System Impact Assessment*, The Rand Corporation, R-1359-DOT, December 1973, pp. 52-64.

**Ibid., pp. 15, 52-53.

reflect *all* costs--including environmental, health and safety protection and other externalities of whatever character which can be internalized. Another way is to try to deal with external effects by direct governmental control and regulation in terms of mandated non-monetary standards--a strategy that will perhaps result in creation of new bureaucracies or increase the burden on existing ones. My objective here is not to stimulate endless dispute about "doctrine" or "philosophy", but rather to suggest that policy analysts should attempt to assist decisionmakers in that very difficult area of designing effective implementation strategies--particularly with respect to dealing appropriately with external effects. Unfortunately, at the present time, this is one of the "unwritten chapters" in policy analysis.*

In sum, much progress has been made in recent years in treating relevant non-economic costs which in the past have often been considered as external effects. Much remains to be done, however, and the present inventory of system impact assessment methods and techniques will have to be developed further and extended over a wide range of subject matter areas (not just transportation).

DISTRIBUTIONAL EFFECTS

Another matter that has been treated rather poorly, if at all, in many past cost-benefit studies concerns distributional effects. In most major policy issues today the question of who gets the benefits and/or incurs the costs (economic and non-economic) is vitally important.

Usually it will not be sufficient merely to calculate aggregate measures of negative benefits for the alternatives under consideration--like noise pollution, for example. In many decision contexts the policy makers may want to know how critical noise exposure levels impact on various family income groups and ethnic groups. This

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*For a good example of an important area where deficiencies in the policy analysis process have been prevalent in the past, see Edwin S. Mills and Frederick M. Peterson, "Environmental Quality: The First Five Years," *American Economic Review*, June 1975. pp. 259-268.

becomes even more meaningful when combined with distributional effects on the benefit side. We have found cases, for example, where a new transportation system seems to bring travel timesavings mainly to the wealthy and critical noise exposure impacts mainly to the poor and/or minority groups.

Some methodology has been developed to permit first-cut assessments of such distributional impacts. However, much more work needs to be done, not only in transportation system impact assessment but other areas as well. I would enter a strong plea for policy analysts in general, and cost analysts in particular, to pay much more attention to distributional effects in future studies of policy alternatives.

IMPLICATIONS FOR SYNTHESIZING STUDY RESULTS AND PRESENTING THEM TO POLICY MAKERS

During my remaining time, I would like to discuss briefly some of the implications of what I have been saying for synthesis of study results and presenting them to our clients.

To set the stage for this, let me make a few remarks about classical cost-benefit analysis as often practiced in the past. Here, synthesis and presentation of study results were usually very simple. For each policy alternative under consideration, the respective costs and benefits were all reduced to aggregate monetary measurements and the alternatives were then compared on the basis of discounted net benefits, internal rate of return,* or some other convenient metric. If there were six significant alternatives for the policy makers to consider, the cost-benefit study results could be summarized in terms of six numbers. While the really good analysts would rarely go so far, all too often some practitioners tried to do so. I doubt that this was sufficiently good practice then, and it most certainly is not appropriate in dealing with most of today's public policy problems.

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*I.e., that rate of discount which makes present value net worth equal to zero.

Thus, one of the main implications of what I have been talking about today is that synthesis and presentation of study results are becoming increasingly difficult problems. Everything cannot be reduced to dollars,* and a number of key attributes (benefits and disbenefits) must be considered explicitly if we are going to assist the policy makers in making more informed choices about preferred future courses of action. The "multivariate objective function" (MOF) problem is with us "in spades."

Analysts have been worrying about the MOF problem for a long time. A number of contributions have been made in recent years, including those by Miller** and Raiffa*** in 1969, and the so-called "scorecard" technique by Goeller in 1973.**** (You will hear about the latter shortly in Goeller's presentation on system impact assessment.) While some significant advances have been made on the MOF problem, much more conceptual and methodological work needs to be done.

I therefore conclude with some feelings of ambivalence. On the one hand I am suggesting that cost analysts must broaden their horizons and do more and better things. On the other hand I recognize the implications of these suggestions for complicating the already difficult synthesis and presentation of study results problems. But the practicing of *good* policy analysis has never been easy. It will certainly be no less difficult in the future.

Thank you.

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*But policy analysts must nevertheless try to put costs and benefits in comparable dollars where appropriate, in order to permit harmonized decentralized decisions that relieve the "overload" at the high levels of our government.

**J. R. Miller, *Assessing Alternative Transportation Systems*, RM-5865-DOT, The Rand Corporation, April 1969.

***H. Raiffa, *Preference for Multi-Attributed Alternatives*, RM-5868-DOT/RC, The Rand Corporation, April 1969.

****E.g., see L. G. Chesler and B. F. Goeller, *The STAR Methodology for Short-Haul Transportation: Transportation Impact Assessment*, R-1359-DOT, The Rand Corporation, December 1973, especially pp. 9-13, 29-34.