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PARETO-BETTER ALLOCATIVE DECISIONS IN DEVELOPMENT PROJECTS

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Imagine, for a moment, that you are an economist with the assignment of evaluating project proposals generated in a regional development project. The Range Specialist submits a plan in which goats will be removed from 25,000 acres of semi-desert range, fences will be put up, and cattle will be grazed after several years of regrassing. Suppose that experiments have been conducted with exclosures and stock water ponds, and that data are available by which development costs and expected returns can be estimated. Suppose that you perform the standard benefit-cost analysis on this proposal, and estimate a ratio of 3.50:1. Suppose further, that you happen to have been raised in cow country, and never have quite recovered from it. Sheep are at the anathema end of your livestock preference scale, while goats are still further down. Under these conditions, it is not difficult for you to recommend this project.

But suppose now that during what should have been a "normal" review process, someone throws a monkey into the wrench-works. You are asked about your plans for the few people who currently are scratching a bare subsistence by selling goat cheese and meat produced on this land. Your first reply might be dictated from habit—that the loss of current income from goats has been included on the cost side of the ledger. The reviewer acknowledges your numbers, but persists in asking about the goatherds who no longer will be allowed to run their goats. But the land is public domain, and the expected net benefits greatly favor conversion of this resource to cattle. The goatherds might learn the new cattle system, or they can move away. To where, and to do what?

As in a bad dream, it eventually comes through to you that these people are resources too. They are a part of the Public presumed to benefit from a resource development scheme. A careful listing and balancing of cardinal numbers may not reflect the totality of relevant effects, on this or many other occasions. Resource allocations traditionally are made on the basis of numeric benefits that exceed numeric costs, with money as the proxy for social value and social cost.² Once you begin to question the complete acceptability of the money proxy—once you face the question of human values—the virus of doubt can spread. It can infect the whole basis of a well-engineered resource allocation system. It can fester for years, and eventually can result in papers like this one.

Should the analyst recognize the needs, desires, values, and goals of people? If so, how are they to be included in the analytical system? I address these two questions in the rest of this paper.

Traditionally, we have held to the belief that our society should be, and remain, a pluralistic one. Our philosophy has been one of encouraging competition in ideas, techniques, and products in such areas as business, politics, religion, and lately, even morality. We point with pride to a considerable social, spatial, and economic mobility of our citizens during these first centuries of our experiment.

But the philosophers from whom we have taken our direction seem not to have remained quite so relevant in recent decades. Industrialization was not adequately anticipated. Production, education and communications are based on mass markets. They are leading to the consuming monolith that industrialization most efficiently serves. One hardly can request large and technically efficient producers to retrogress to small enterprises, handicrafting for a local market. One dare not legislate the atomization of our communications media, nor require that no university admit more than 2000 students and 200 professors.

The monetary efficiency criterion may not be the complete criterion for decisions in the public sector. Efficiency measured by the money proxy may not allocate resources properly with respect to our co-existent social goals. Social pluralism can be encouraged, or discouraged, through the decision criteria by which public decisions are affected. Perhaps we need to institutionalize Rousseau's *Social Contract* by means more workable than the now impossible town meeting. Our philosophical commitment to majority rule does not take into account the potentially tyrannical efficiencies that can flow from an industrialized Public. There still is little danger of fooling all the people all the time, but there is an increasing prospect for fooling a bare majority of the people all the time. In a strict political democracy, wedded to a strict laissez faire industrialized economy, we have sufficient means to destroy our pluralism.

We might reach an easy agreement that no sane member of our society wishes to starve, to go naked in winter, or to remain illiterate. But beyond the broad necessities, the agreeableness of one's life is a matter of the personal preference or antipathy for the details of one's environment. It is more comfortable for the person, and easier for the decision analyst, if all members have the same preferences and antipathies. In this case, the analyst may abstract slightly by indexing goods and services in convenient money terms. He then can economize by a suitably complex adding-up of costs and benefits for the "average" member of the society.

Perhaps most of us in the mainstream of conventional wants and behaviors are represented well enough by rectangular holes in cardboard, or by magnetized spots on a spool of tape. One may differ from one's neighbor in preferring a split-level and Bach to his colonial and Brubeck. But even then, nothing much is lost when all are converted into common monetary proxy terms, and programmed.

A pluralistic society must allow, and may not require, a choice between Bach and Brubeck. Such a society allows the inclusion of goods and services desired by a minority, as long as these are not demonstrably destructive to the majority. Mud between the toes is allowed, though the majority may feel that people should wear shoes. Mud on my alfalfa from your eroding field is not allowed, if I object, even though the Public is indifferent to my alfalfa. The blood-smell of a newly shot buck is allowed, so long as the deer is legal, even though the Public frowns on outright exercise of the killer instinct. My gut-paralysis at raising a week's pay on three jacks into a blind hand is allowed, as long as my children are fed, even though the Public feels that one should not gamble a week's pay, or not on three jacks in any case. I am allowed the familiar feel of weathered siding against my back, and of hazy ridgelines against my eyes, even though the majority opinion in my society is that I should be cultivating the corn rather than day-dreaming.

Given a threshold supply of the basic necessities, other goods and services of my choice may be preferred to some marginal increment in my purchasing power. I argue that nondestructive minority goals, attitudes, and activities are required parts of a pluralistic society—that a Public including such variation is both desirable and healthy.

I suggest that public resource-use decisions strongly affect the Public environment, and therefore, the private environments of the people who make up the Public. We need to develop the habit of identifying monetary and non-monetary effects of resource allocation proposals, on the various members of the Public.³ This argues for a system of identification and analysis that is more flexible than the conventional benefit-cost analysis. The Pareto-Better criterion suggests itself as such a system.

A Pareto-Better system is said to obtain if:

1. No person will be worse-off, (the set α)
2. At least one person will be better off (the set β)

should a given event obtain.

Suppose a State $\sim S$ that obtains in the absence of an Event E . Then we may define the system such that State S obtains conditionally upon Event E . The logic reads:

$$(S | E) \cap (\sim S | \sim E) \quad 4$$

The State S and its negative may be defined in any way that is meaningful. We may include the restriction that the State is measured in pure money-proxy terms, giving an effect of the benefit-cost criterion. The primary advantage of the Pareto-Better is that the State S need not be defined in so restricted a manner. Indeed, the State may be defined by each person in the affected set, in his own terms, and a "rational" decision is still possible. The decision criterion is in terms of the numbers of people in the State, not in terms of the State itself.

If B denotes the Pareto-Better condition, and I_i denotes the i th person in the affected Public, then the logic reads:

$$B | (\alpha = 0) \cup (\beta \geq 1) \quad 5$$

where,

$$\alpha = (S(I_i) | E) < (\sim S(I_i) | \sim E)$$

and

$$\beta = (S(I_i) | E) \geq (\sim S(I_i) | \sim E)$$

Thus, the set α of people who will be worse-off under Event E must be empty, and the set β of people who will be better-off under Event E must be non-empty. The Pareto-Better condition holds only if **both** of these requirements are satisfied. Logic does not require that all people in the affected population be included in one or the other of the two sets. The indifferent and/or apathetic individuals are not involved under this decision criterion.

There is no requirement that the State S be defined as a single condition, but only that the Event E must be identifiably the same for the entire affected population. It is likely that a large variety of conditions will be defined as State S by a heterogeneous population, and that some conditions in State S will be measured in money terms, while others are not.

The flexibility of the State definition may seem to threaten a conceptual anarchy to the analyst who is concerned with a resource allocation defined as Event E . This threat puts the burden on the analyst. He must prepare his best estimates of an Event definition that is meaningful to the Public, and he must anticipate as best he can the possible and likely conditions in State S . The analyst must try to anticipate the economic, social, esthetic, and other conditions in the Public environment that may change under Event E . He must then try to estimate the numbers and types of people in the affected Public that might be expected to favor or dislike these States. He should even hypothesize reasons for peoples' placing themselves in either of the sets α or β .

A properly researched allocation decision would require that the analyst quantify those environmental conditions of members in both sets that lend themselves to quantification. The decision may rest on attempts to find out what alterations in Event E will change the count of people in the two sets. What anticipated States would lead people to remove themselves from the worse-off set α ? What States would lead people to put themselves in the better-off set β ?

Modifications to State S might include compensation to people such that they will be induced to shift from worse-off to indifferent, or even to better-off. Again, compensation might be defined in money terms and quantities. It could also be defined in terms of esthetic values, job retraining, physical re-location, continued use-rights or access, or other human environmental considerations.

If we recognize that most affected people put themselves into one or the other set according to their subjective expectations of the State S that will follow from Event E , then we might be prepared to exercise the arts of communication, education, and persuasion to affect these expectations. Such a prospect indicates our need for more expertise in things like the Bayesian Calculus, and in evaluating decisions in which both cardinal and ordinal systems of quantification are involved.

I began this paper with a supposed situation in which beef cows were to be substituted for goats, and a traditionally calculated benefit-cost ratio of 3.50:1 was found. In the real world of resource allocations from the public domain, analysts seldom are asked questions about the non-monetary effects of proposals. In the real case of the example, such a question was asked, the project proposal was shelved. The goatherds won a battle that they didn't know was being fought. The Public might have lost a battle for greater productivity of a land resource, without knowing of the loss.

I suggest that an analysis of this Project, in suitably Pareto-Better terms, might have turned up a compensation that would have removed goatherds from the α set of worse-off. Once this set was empty, and the costs of emptying it added to development and income-lost costs of the project proposal, then one could have progressed under the more restrictive procedures of the usual benefit-cost analysis. The analyst might have done his job, had he identified the goatherds and potential members of the worse-off set, and developed plans for compensatory adjustments in the project proposal to remove these members to the neutral or better-off set. Lacking this orientation, the analyst

could not justify the project proposal. One wonders how many resources are mis-allocated in the Pareto-Better sense?

FOOTNOTES

1. Farm Production Economics Division, U.S.D.A. The views expressed in this paper are those of the author and do not necessarily represent those of the Economic Research Service or of the U.S. Department of Agriculture.
2. See article by Maass in *Water Research*.
3. See especially part IV, Implications, pp. 73-82 of Bromley *et al.*
4. p. 5. The use of the conjunction "or" between two state definitions produces the binary condition of the classical "excluded middle."

An alternative definition would be:

$(S \leftrightarrow E) (\sim S \leftrightarrow \sim E)$ This is a statement of causality, not of statistical correlation!

5. The use of the conjunction "and" between two state definitions requires that **both** be true for the condition B to hold.

REFERENCES

1. D.W. Bromley, *et al.* "Procedures for Evaluation of Water & Related Land Resource Projects: An Analysis of the Water Resources Council's Task Force Report." Center for Resource Policy Studies, Univ. of Wisconsin-Madison, April, 1970.
2. Arthur Maass; "Benefit-Cost Analysis: Its Relevance to Public Investment Decisions," in *Water Research*, edited by Allen Kneese & Stephen Smith, Resources for the Future by The Johns Hopkins Press, Baltimore, 1966.