

**ENVIRONMENTAL POLICY EVALUATION
WITHIN A SOCIAL CONTEXT:
THE NECESSITY OF SYNTHESIS**

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ABSTRACT

The interdependencies between environmental policies and policies for almost all the rest of society's concerns are receiving a growing recognition. Nevertheless, current evaluation of environmental policies fail to satisfactorily account for these interdependencies. The major reason is that presently applied evaluation approaches practice *analysis* instead of *synthesis*. This paper elaborates on the consequences of applying analysis, the need for attempting synthesis, and the principles that must govern synthesis in environmental policy evaluation.

Introduction

Environmental policies are debated with a growing awareness of the interdependency among most of society's concerns, e.g., among the concerns of environmental protection, economic development, and conservation of natural resources. Moreover, the debate unveils a widening diversity of opinion on the priorities of society's concerns among a growing number of interest groups.

With regard to environmental policy evaluation, these observations strongly support the assertion that environmental objectives should be evaluated within a social rather than a private context and, therefore, synthesis rather than analysis of these objectives should be attempted. Elaboration on this assertion is a primary purpose of this paper. An effort is also made to delineate the task of synthesis

and lay the conceptual foundations of a comprehensive approach to policy evaluation within a social context.

The remainder of this introduction is devoted to the definition of certain key functional concepts that will allow a concise presentation of thoughts. The next section discusses the web of interdependencies, awareness of which establishes the need for synthesis. In subsequent sections the limitations of analysis are pointed out and the social context for policy evaluation is conceptually founded. Finally, the relevancy and applicability of the proposed approach to policy evaluation are reflected upon.

SOCIAL STATES AND SOCIAL TRAJECTORY¹

For decision making purposes, society's goals are expressed in terms of objectives denoting attainable ends, as for example the goal of protecting environmental quality is expressed in terms of objectives such as those restricting the ambient concentrations of various air pollutants to certain target levels. The set of observed or target values for all the objectives expressing all of society's goals will collectively be referred to as an observed or target *social state*.

Alternatively, it can be stated that a social state may be expressed in terms of the *values* for all the social objectives, as for example, those for ambient concentrations of air pollutants (associated with the environmental protection goal), employment levels (associated with the economic development goal), energy consumption levels (associated with the goal of conservation of natural resources), etc.

With reference to a time horizon, society may direct its efforts to achieve a temporal series of target social states. The set of all social states that will be associated with the successive points of a time horizon will be collectively referred to as a *social trajectory*.

ECONOMIC STATES AND ECONOMIC TRAJECTORY

Society achieves a social state by operating its economic activities which process resources to meet the implementation requirements of the objectives of a social state. Economic activities are monitored in terms of:

1. economic variables such as employment, income, investment, capacity, inventories; and
2. variables reflecting the employed technology, such as input-

¹ The thoughts about these concepts were stimulated by the article of Papandreou and Zohar [1].

output coefficients indicating the rate at which each commodity is used in the production of one unit of another commodity, emission coefficients indicating the rate of emission of pollutants for carrying out an economic activity at a unit level of operation.

The values of all these variables at a given time will collectively be referred to as the *state of economy* or as the *economic state*.²

With reference to the same time horizon of a social trajectory, an *economic trajectory* will also be related, comprised of all the economic states that will be required to implement the states of the social trajectory.

The Web of Goal Interdependencies

With reference to the previously defined functional concepts, it is clear that environmental policies address directly only a subset of the social objectives that comprise a social state. Moreover, their implementation involves directly only a subset of the variables defining an economic state.

The evaluation of environmental policies, therefore, may follow two distinctly different approaches. It may practice *analysis* by concentrating almost exclusively on these subsets of social objectives and economic variables. Alternatively, it may attempt a *synthesis* of these subsets with their total sets, the social and economic states.

What differentiates the two approaches is the extent to which they take into account a web of interdependencies that exists among the objectives of a social state, among the variables of an economic state, between a social state and an economic state, and among the states of a social and economic trajectory. As will be shown later, the validity of evaluation recommendations greatly depends on their accounting for these interdependencies.

SOCIAL GOAL INTERDEPENDENCIES

Direct social goal interdependencies –Consider two policies designed independently of each other and addressing directly two different social concerns. As pointed out in the introduction, there is a growing

² Since concern over the state of the economy is part of the set of social concerns, it follows that certain objectives of a social state will have a direct association with the variables of an economic state.

awareness of the high probability that both policies have a joint impact on the social objectives for which they were primarily designed.

As a result of this *direct social goal interdependency*, the two policies cannot possibly be pursued without adjustments in the achievement levels initially sought for their objectives. Such adjustments, however, will transform the policies to two different ones which must be studied further for the other types of interdependencies to be discussed.

Think, for example, of the social concerns for health and environmental protection. To the extent that health is affected by environmental conditions, independent design and evaluation of health and environmental policies cannot produce viable policy recommendations. There should be an accounting for the *direct social goal interdependencies* among the objectives of these policies.

Indirect social goal interdependencies—Two policies directly addressing two different social concerns and having *no* joint impact on their social objectives may still be connected with an *indirect social goal interdependency*. This will be the case when society cannot reach an economic state that can simultaneously satisfy the implementation requirements of both policies.

Consider for example the case of policies for the social concern over air pollution and energy shortage. Air pollution policies demand that the economic processes respond to this social concern by adjusting to, among other ends, the production of a less polluting automobile. On the other hand, “energy independence” policies ask for an automobile that will consume less energy. However, according to the present state-of-the-art in automobile technology the economic state can only produce air pollution control devices that may be more energy consuming. Therefore, such indirect social goal interdependencies should be taken into account when planning for implementable air pollution and energy objectives.

ECONOMIC INTERDEPENDENCIES

Interdependencies also connect the variables and functions of an economic state. Thus, *economic interdependencies*, too, determine the outcome of a policy that might have been selected by considering only the economic variables directly associated with its implementation. In fact, economic interdependencies generate another kind of indirect social goal interdependency among social objectives.

Consider for example that an environmental policy may

necessitate pollution abatement facilities requiring total capital investment by itself well within the limits of the capital market. However, the implementation of the policy will still depend on all the economic forces which regulate the capital market and the total capital demand for implementing all policies for all social concerns.

DYNAMIC INTERDEPENDENCIES

Study of social and economic interdependencies is a prerequisite for setting as a target a social state with consistency among its social objectives and among its implementation demands on the functions of an economic state. The implementation of such a state, however, will still depend on the implications of *dynamic interdependencies*.

Dynamic interdependencies are of the same nature as the previously described social and economic interdependencies. They are associated, though, with all social states of a social trajectory and with the relationship between a social and an economic trajectory. They are generated by the fact that most of society's goals cannot be satisfied over the span of a social state. They can instead be achieved over the span of a social trajectory incorporating social states which include the objectives expressing the progressive achievement of such goals.

Accounting for dynamic interdependencies should consider the following possibilities. Progressive satisfaction of certain goals might contribute to the assignment of a higher priority to other goals.³ Changes in the alliances of interests, partly as a result of the satisfaction of certain goals, might have a similar effect on the priorities of goals. Moreover, new goals might be formulated and radical changes in values might occur because of entropic changes in natural as well as social and economic systems.⁴

Think of the Clean Air Act, the Federal Water Pollution Control Act and their numerous amendments.⁵ They provide examples of social objectives extending over a time horizon and illustrate the dependence of social and economic states on preceeding states for

³ As societies mature in economic development they place a higher priority on the protection of the quality of the natural environment.

⁴ For an excellent treatment of the applicability of the entropy law to economic and other social processes [2].

⁵ 42 U.S.C. § 1857 (1970); P.L. 80-845, § 5, 62 Stat. 1155 (1948); P.L. 87-88, 75 Stat. 204 (1961); P.L. 89-234, 79 Stat. 903 (1965); P.L. 89-753, 80 Stat. 1246 (1966); P.L. 91-224, 84 Stat. 91 (1970).

the continuous advancement of such objectives. Furthermore, they also help to conceptualize the impact of entropic changes resulting from the continuous debate about their objectives and their implementation time schedule as well as from the impact on this debate of the suddenly emerging concerns over energy shortages and economic recession.

The Limitations of Analysis in Policy Evaluation

Understanding of the interdependencies points to the limitations of a policy evaluation founded on analysis of individual social objectives. Consider the evaluation concepts of feasibility, efficiency, and ordering which are the focus of current policy evaluation practice. Their traditional definitions can be summarized as follows. Feasibility implies availability of resources and know-how for implementing a policy choice. Efficiency requires that there is no other feasible policy choice with the same commitment of resources which can lead to a higher achievement level of one objective without leading to a lower achievement level for some other objective from those objectives addressed by the policy choices under evaluation.⁶ Ordering differentiates efficient policy choices according to their degree of satisfaction of a criterion of choice.

The logic for assessing feasibility is straightforward. The assessment of efficiency should be supported to avoid wasting society's limited resources. Ordering is required because of the efficiency of more than one policy choice.

In not accounting for the web of interdependencies, a policy evaluation founded on an analysis of individual objectives independently of a reference social state and trajectory can reach only *quasi-feasibility*, *quasi-efficiency*, and *quasi-ordering* assessments.

QUASI-FEASIBILITY ASSESSMENT

Availability of resources and know-how are not the only determinants of the feasibility of individual objectives analyzed independently of a reference social state and social trajectory.

The web of interdependencies previously discussed establishes the joint impact on the same objectives of different policies as another determinant of feasibility. In the same manner, it also establishes as determinants of feasibility the conflicting demands on the economic state by different policies, the functional inter-

⁶ The concept of efficiency of a policy choice is based on the notion of productive efficiency that has been most thoroughly analyzed by T. C. Koopmans [3].

dependency among economic variables, the dynamic implications of present resource commitments and satisfaction of social objectives for society's values, and the entropic changes in natural, social as well as economic systems.

Analysis, therefore, may conclude that a non-feasible policy is feasible and vice-versa. Think, for example, of the possibility that analysis may assess an environmental policy as non-feasible because the policy may seek curtailment of air pollution at levels assessed by analysis as non-feasible. It may very well be the case, however, that energy conservation policies may indirectly contribute to the targeted curtailment of air pollution levels. Thus, synthesis of environmental and energy objectives may assess as feasible certain achievement levels for these objectives that analysis may assess as non-feasible.

QUASI-EFFICIENCY ASSESSMENT

As it was implied before, efficiency is a property of a subset of feasible choices. Since analysis can lead, therefore, only to quasi-feasibility assessments, it follows that it can also lead only to *quasi-efficiency* assessments.

Even in cases where individual choices may indeed be feasible, analysis may still lead to quasi-efficiency assessments. Such will be the case when the choices assessed as inefficient by analysis can be incorporated into an efficient social state while those choices assessed as efficient by analysis cannot.

The last syllogism implies, of course, that the evaluation concept of efficiency should be applied to social states and trajectories instead of individual social choices. It is submitted that the very concern addressed by this evaluation concept supports this premise.

A feasible social state will also be efficient if it satisfies the following two conditions. First, the economic state that implements this social state cannot implement another social state that provides higher achievement levels of certain objectives without achieving less of certain other objectives. Secondly, there is no other social state that may provide the same achievement levels for all objectives, and can be implemented by an economic state which processes lesser quantities of certain resources without processing higher quantities of other resources.

QUASI-ORDERING

Limited resources, technological capability, as well as flexibility of individual and collective values present society with the problem of choice among policies associated with the objectives of alternative

efficient social states and trajectories. As a result, society needs a criterion of choice and an *ordering*, according to the criterion, of its alternative choices.⁷

The prevailing criterion is the traditional ratio of the value of goal achievement (benefits) to the value of committed resources (cost). It is a conceptually sound criterion for a society with limited resources. However, as it is currently applied in conjunction with analysis of social objectives it can establish only a *quasi-ordering* of social objectives and of policies associated with these objectives. The reasons are not difficult to conceive.

Analysis, by virtue of its independent consideration of particular objectives, can use only market prices for evaluating benefits and costs. These prices, however, project only *individual's preferences* for objectives examined independently. As a result, they cannot be used to formulate collective choices. Moreover, they are sensitive to the impact on individual values and preferences of all policies for all the objectives of a social state and trajectory. Therefore, they cannot establish in advance accurate evaluations of benefits and costs.

Furthermore, analysis cannot account in its estimates of benefits and costs for the value that all the interdependencies have for society.

It follows from the discussion of this section that when analysis is pursued and interdependencies are left unaccounted for, policy evaluation is severely limited by faulty applications of the evaluation concepts it chooses to apply.

Environmental Policy Evaluation Within a Social Context

Awareness of the limitations of analysis for policy evaluation leads to the assertion that environmental policy evaluation should be conducted within a *social context*. The essential requirement of this approach to evaluation is that environmental objectives should be synthesized with all the objectives of all the states of a social trajectory.

The following notions constitute the conceptual framework of a policy evaluation within a social context.

SOCIETY PERCEIVED AS AN ORGANIC CHOOSER OF ENDS

By definition, all the social objectives of all the states of a social trajectory reflect, affect and depend on the collective values of all

⁷ For a thorough and up-to-date discussion of alternative orderings or rankings [4].

members of society. Therefore, in ordering society's choices for individual objectives, states, or trajectories, society must be perceived as *an organic chooser of ends*.

Ordering of social choices for a society perceived as an organic chooser of ends should reflect the joint outcome of an evaluation according to two criteria: *maximization of net levels of goal achievement*, and *maximization of level of concert*.⁸

MAXIMIZATION OF NET LEVELS OF GOALS ACHIEVEMENT

Application of the first criterion requires identification and enumeration of all benefits and costs of all policy choices for pursuing individual social objectives, social states, or social trajectories. In a social context benefits and costs should be defined in terms of goals achievement. Thus, benefits should reflect the progression towards society's goals sought through the objectives of a policy choice. On the other hand, any retrogression from society's goals caused by the objectives of a policy choice should be reflected in the cost of the latter. Emissions of air pollutants associated with an economic policy, for example, should be recorded as cost because they represent retrogression from the goal of preserving air quality.

Such a definition of benefits and costs accounts for the fact that in a social context the value of all interdependencies is an integral component of the value of these two evaluation parameters. As a result, since the value of interdependencies is expressed by *shadow prices*, it follows that the above definition necessitates an evaluation of benefits and costs in terms of shadow prices that reflect social instead of private valuations of welfare.⁹

The outcome of a *benefit-cost analysis in a social context* will be to rank first those policy choices which will maximize net level of goals achievement.

MAXIMIZATION OF LEVEL OF CONCENT

The fact should not be overlooked, however, that different segments of society prefer different achievement levels for social goals. As a result, different estimates of benefits and costs must be derived for each interest group. A synthesis of these different

⁸ [L *concentus*, fr. *concentus*, pp. of *concinere* to sing together, fr. *com* + *canere* to sing] *archaic*: harmony, Webster's Seventh New Collegiate Dictionary, (Springfield, Mass.: G. & C. Merriam Co., 1969).

⁹ The terms *shadow* or *accounting* prices are used to distinguish these prices from the market prices.

estimates will subsequently be required to establish an ordering according to the net goal achievement criterion for a society perceived as an organic chooser of ends.

As must be expected, though, there can be no ordering that will reflect a complete satisfaction of all different preferences and priorities and consequently an absolute *concent* among interests. Rather what may be reflected are *priority tradeoffs*, among achievement levels of goals and among satisfaction levels of interests, that will have a different value for the various segments of society.

Therefore, in establishing an ordering of society's priorities the additional evaluation criterion of *maximizing the level of concent* must be applied. The most preferred social choices according to this criterion will be those that will require priority tradeoffs with a minimum total value for all segments of society. Failure to recognize the inevitability of priority tradeoffs, account for their value, and attempt to maximize the level of concent can only permit discord and opposition to deny orderly progress to society.

Application of this criterion requires a comprehensive *scanning of the priority tradeoffs* that all interest groups of society are willing to make among different levels of goals achievement and among their interests.¹⁰

In recapitulating, policy evaluation within a social context requires an ordering of priorities of choices for a society perceived as an organic chooser of ends. The criteria for establishing this ordering are maximization of net levels of goals achievement and maximization of level of concent.

ENVIRONMENTAL POLICY EVALUATION WITHIN A SOCIAL CONTEXT

Application of the proposed evaluation framework to environmental policy choices requires the following operations. First, environmental objectives must be considered as elements of the set of all social objectives for all points of a time horizon. Such a *synthesis* of environmental objectives will facilitate the identification and evaluation of the *interdependencies* between environmental objectives and the rest of society's objectives. These interdependencies must include, in addition to the direct and indirect interdependencies among social goals, economic and dynamic interdependencies.¹¹

¹⁰ A Priority-Tradeoff-Scanning approach to evaluation has been developed in Davos [5].

¹¹ For a model and a computer program that converses with its user in trying to evaluate the interdependencies among alternative policy choices and their shadow prices [6-8].

Next the value for society of all interdependencies must be expressed by *shadow prices* which must be used for deriving estimates of the benefits and costs of environmental objectives and policy choices. Thus, benefits and costs will reflect social instead of private valuations of welfare. Such evaluation of benefits and costs is in accordance with the requirement of expressing them in terms of goals achievement when evaluation is attempted within a social context. As an example, think of the repercussions that environmental policies may have on the economy. If these repercussions are valued as positive they must be counted as additional benefits. If they are negative they must be counted as costs.

The evaluation of benefits and costs in a social context notwithstanding, benefit-cost analysis and its criterion of *maximizing net levels of goals achievement* cannot alone determine the priority ranking of environmental objectives and policies. Since different segments of society place different priorities on environmental objectives there will be a need for scanning and evaluating *priority tradeoffs*. Consequently, the final step will be to derive different estimates of benefits and costs for all interest groups of society and then to scan all priority tradeoffs that all interest groups knowing their benefits and costs, are willing to make among levels of goals achievement and among their competing interests.

The outcome of the last two operations will be to rank all environmental objectives and policies according to their potential for *maximizing the level of consent*.

Environmental policy evaluation according to the proposed approach enables the ultimate decision maker to decide on the priority tradeoffs for society between environmental policies that may maximize net levels of goals achievement but may also create conflicts among interest groups, and policies that may maximize the level of consent but may also make less efficient use of the committed resources.

The estimation of benefits and costs in a social context separately for each interest group and the scanning of priority tradeoffs offer an additional advantage. They allow the selection of those environmental objectives that can be incorporated together with the rest of society's objectives in a social state which can launch society on a trajectory of *orderly progress* with a minimum of contradictions, conflicts, and discontent.

Reflections

Two critical questions might be raised regarding the suggestion for a policy evaluation within a social context and the requirement for synthesis of all society's goals.

THE CONCEPT

The first question relates to the concept of *social context*. The relevancy might be questioned of establishing an *ordering of priorities* for a society perceived as *an organic chooser of ends*; for it is true that both of these notions have been found difficult to associate with even the most rigorously planned societies.

It is submitted that both notions are relevant, crucial and independent of the extent to which society is centrally regulated. Moreover, they establish a more socially responsible basis for policy evaluation.

Consider society's political system which, being responsible for goal attainment, is asked to distribute with conflicting priorities society's resources among the elements of a steadily expanding list of competing social ends.¹² The system does not have, however, the capacity of absorbing multiple objectives and giving uniquely determined answers. Neither has it the ownership of values to resolve the conflicts among contradicting objectives as well as competing interests and balance an assessment of their priorities.

There is a definite need, therefore, for the demands for goal attainment imposed on the system to be the outcome of a debate on priority tradeoffs among all interested segments of society.¹³ If this assertion is accepted, then the relevancy of the notions of an *ordering of priorities* for a society perceived as *an organic chooser of ends* as well as of the criterion of *maximizing the level of concert* by minimizing discord is established.

THE APPLICATION

The second question regarding the suggested approach to evaluation relates to its applicability. The point needs to be emphasized that it is not feasible given the present state-of-the-art to model all the interdependencies and derive all shadow prices for evaluating benefits and costs in a social context. Neither is it likely that an absolute concert can be reached for all social objectives, states and trajectories among all interest groups of society. Consequently, it is not presently feasible to accurately assess all benefits, costs, and priority tradeoffs in order to accurately assess the feasibility, efficiency and ordering of social choices.

¹² The definitions and arguments about the political system's role are drawn from Easton and Parsons [9, 10].

¹³ It should be emphasized that in a debate on priority tradeoffs a consensus is sought that will undoubtedly reflect individuals' preferences; these preferences will be associated, however, with goal and interest priorities and they will not relate to *individual* goals for *particular* social concerns.

Nevertheless, there is a relevant distinction between inaccurate and quasi-assessment. Evaluation within a social context, although handicapped, will always be accompanied by a clear understanding of what was left unquantified and how as a result the priority tradeoffs among interest groups might have been influenced. Thus, it will represent the only realistic avenue to *orderly progress* towards launching society on a trajectory of concert.

In contrast, the lack of comprehensiveness that characterizes the current evaluation approaches which practice analysis and evaluate their parameters in a private context leads to misinterpretation of feasibility, efficiency, and ordering. The result is not only a diminishing level of concert and orderly progress, but also conflicts and discontent are created that progressively become by themselves social problems. Thus, increased amounts of limited resources and valuable effort are devoted to cope with extrinsic problems. One has only to think again of the Clean Air Act and what the continuous debate on its provisions and the continuous self-defeating postponements of the deadlines for its goal achievement entail to appreciate the consequences of analysis.

THE ADDITIONAL CRITERION OF FACILITATING ORDERLY ADJUSTMENTS

Since the limitations of a fully applied policy evaluation within a social context are operational instead of conceptual, they can be overcome by incorporating an additional evaluation criterion. It will require the assignment of a higher priority to those policy choices that may contribute to the need for *orderly adjustments* in a social trajectory after the experience of previously unforeseen policy impacts, value changes, and realignment of coalitions of interests.

Alternatively it can be stated that policy choices should also be evaluated for their adaptability to required orderly adjustments in a social trajectory. A flexible environmental policy that may be adapted by calling for less ambitious objectives in order to respond to emerging realities such as those of energy shortage or economic slowdown will be ranked very high according to this additional evaluation criterion.

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