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Input-Output Analysis and Social Planning

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Social planning today could be characterized, somewhat cynically as an idea in search of both elaboration and structure. Since the Enlightenment, intellectuals have been fascinated in various ways with the union of rational thought and action; and much of modern life is, in fact, based on planning in this broad sense of action based upon forethought. Planning is defined here as rational problem-solving and social planning is that genre of problem-solving expressly focused on problems of, or affecting, the general welfare. This perspective is taken to explicitly emphasize the governmental role in social planning. First, it needs to be observed that governmental powers to interfere with the general welfare, particularly at the federal level, have been sharply circumscribe by constitutional tradition in the United States. Secondly, all governmental action can be seen within the strong normative framework of constitutional and statutory law.

In this framework, nongovernmental social planning is one of the rights of citizens. However, within this organized field of planning progress has been a very unsteady mistress. What two decades ago was generally accepted planning theory is today a shambles from a theoretical standpoint. This state of affairs has come about partly as a result of the confrontation of planners with the unnerving realities of social existence and the seeming paradoxes of development and reform (Altshuler, 1965; Friedmann, 1966; Dror, 1967; Meyerson and Banfield, 1955; Braybrook and Lindblom, 1963) However, another less discussed but potentially significant factor is the continuing advance of social science knowledge, which has challenged many cherished planning notions such as the ideals of synoptic rationality, and neutral, apolitical professional and technical judgement.

This situation is viewed with alarm, resignation, frustration, cynicism and a range of other emotions by persons engaged in planning and the use of planning outcomes. It is the view of this paper that although the accomplishments of planning in the public context have been, on the whole, relatively minor, there is no real cause for concern. Certainly, if planning has not fared well in the public arena, one can ask what other basis for innovation has? For centuries men have been concerned about the many paradoxes which impose themselves on public social life. Machiavelli was concerned with the use of power in 15th century Italy (Machiavelli, 1950). Utilitarian philosophers have long sought the felicific calculus; that optimum balance of the interest of society and the individual (Mitchell, 1918). Still others have sought an ideal mix of the rights of the individual and the power of the state; of the compatible

interface of cooperation and conflict; and of the combination of altruism and self-interest (Altshuler, 1965, 392-408).

From the standpoint of action, the results of contemporary efforts in these directions have been confusing, disappointing and perplexing. Kenneth Arrow has proven that the interests of all individuals cannot simultaneously be maximized (Arrow, 1951). Lipset suggests that conflict is a necessity underlying stable democracy (Lipset, 1963, 2-26). Max Weber (1968), Robert Merton (1968), Herbert Simon (1955), Anthony Downs (1967) joined many others to support the view that organizational behavior is self-oriented, and the interests of the individual and the organization are frequently in conflict. Taken together these findings have severely savaged the view of planning as sweet reason in pursuit of altruism, decency, justice, equality and truth.

What then can be put forth as a rationale for continuing to expend energy in this direction? As a technical and methodological level, planning activities apparently have benefited from developments in social science. At a more substantive level, planning theory has benefitted greatly from two tendencies. The first is best represented by Braybrooke and Lindblom's *Strategy of Decision*, and amounts to recognition of the limits of human capacity for rationality Although the strategy of disjointed incrementalism is periodically attacked as a rationale for the status quo, it nonetheless is an important effort to come to grips with actual as opposed to projected rationality. Another helpful development has been the tendency in planning and administration to link technical means with political, moral or ethical ends. In particular, see Notes on a Conceptual Scheme" in Meyerson and Banfield (1955, 303-329) and the latter chapters of Braybrook and Lindblom (1963).

The focus of this paper is on the development of tools and techniques suitable for use by professional *technopols* (technically oriented politicians) and technicians in the employ of policy-makers toward the end of better public decisions. Social planning is viewed as an essentially political process designed to affect the general welfare by modifying the distribution of burdens and benefits to the members of society. Public policy-making, in this sense, involves the "authoritative decisions that allocate the burdens and benefits for the entire society" (Easton, 1971. Chapter 5). In this light, tools, techniques, knowledge and other scientific instruments represent marginal, rather than central aids to decision-making. That is, whether better decisions and more desirable ends flow from the results of these decisions is not generally related to the quality of these tools.

The principal thrust of the paper is toward development and demonstration of a conceptual basis for applying the technique of Input-Output Analysis, as devised by economist Wassily Leontief, to non-economic uses in planning (Leontief, 1951; 1965). Theory as such is involved at to levels: the theory as opposed to the methodology of the analysis technique; and the theoretical system to be subjected to analysis.

Input Output Theory

Input-output analysis, if it can be modified, appears to have a number of possible uses in social planning. First, the technique incorporates a capacity for integration and simultaneous consideration of large amounts of information. The Leontief model of the U.S. economy, for example, contained data on the inter-relationships of 88 separate industries. Secondly, the technique is compatible with relatively sophisticated prediction techniques. However, the most important reason for interest in this approach is that it is particularly well suited for analysis of two generic social planning problems; anticipating changes in complex sets of interactions and predicting otherwise unanticipated consequences. The first problem, encompassing such matters as coordination of service delivery systems, is assumed in this paper to be a characteristic of federal or federated social systems. Such systems are defined by their leadership of constituent social units, and are juxtaposed against hierarchical social systems. Federal systems are those involving reciprocal control of leaders by leaders, while hierarchical systems involve control of followers by leaders. Thus, the relationship between the Secretary of The Department of Health, Education and Welfare (H.E.W.) and the staff of the Social Security Administration is hierarchical. While the relationship between the staff of H.E.W. and the head of the Massachusetts Department of Health is, in theory whether or not in fact, federal.

Unanticipated consequences are generally one of two types: externalities, or effects outside the original range of consideration, and second order consequences, or unexpected effects arising out of expected effects. Both of these problems are also extremely common in voluntary agency planning at the community level. (See, for example, Rein 1970, 103-137; Marris and Rein, 1967; Titmuss, 1968, 72-83)

According to Leontief, input-output analysis in economics is based on general equilibrium theory, or the view that a "a state of balance or adjustment exists) between a small number of conflicting forces" (Leontief, 1965). Equilibrium in economics, as in physics, is a defined characteristic of quantified, reciprocal relationships between a set of factors or variables (Russett, 1968). In the Leontief table, this reciprocal relationship is evidenced by the fact that total inputs equal total outputs, and provide the basis for applications of matrix algebra to the input-output tables. Utilization of analysis at this level of sophistication on social subject s would, at present be impossible due both to lack of adequate data and adequate theory.

A principal reason for insisting on stable equilibrium as a condition underlying the Leontief table would appear to be to link it with the full body of deductive economic theory, and in particular, national income accounting. However, Leontief himself describes the approach as inductive, empirical economics. This could provide a basis for an alternative view of this technique divorced from the main body of economics and instead tied to the behavioral sciences. Assume for the moment that in constructing the table, Leontief has gone out to directly observe American industry in the best empirical tradition and decided it can be divided into 88 categories.

Further, he has observed relationships between those various categories and recorded them in the cells of the table through the use of numerical indicators. On the basis of external considerations (from economic theory) these particular indicators (dollars) are widely agreed to be in a state of equilibrium. To the extent that the Leontief table is inductive and empirical, however, we cannot infer that because the indicators are in balance that reality is also. If this is so, then the first major application of Input-Output Analysis in non-economic contexts would appear to be in situations where a set of indicators can be defined to be in a state of equilibrium. The most obvious example of this would appear to be cases where economic variables, such as income and expenditures, and the like are used as indictors of non-economic realities. This approach will be examined later in this paper in the context of federal-state income and expenditure flows as a close set of indicators of policy flows. Before that can be examined, however, we must examine a second, compatible line of investigation.

Inputs, Outputs and General Systems Theory

Another of the great handicaps to utilization of Input-Output Analysis involves what we might call the quantification barrier, or the difficulty of developing mathematical indicators for social variables. In recognition of this difficulty, I would like to fall back temporarily on a non-mathematical, semantic discussion of the logic of input-output analysis.

Without swimming too deeply into the terminological morass of systems theory, we may note that inputs and outputs as used in Input-Output Economics are roughly analogous to inputs and outputs as those terms are used in a wide range of systems applications in the social sciences. Further, we may note that inputs and outputs as used in the social sciences are frequently analogous to causes and effects. As an example, Thomas Dye (1966) presents a multiple regression model to support his investigation of inputs (personal income, levels of education, etc. as causal factors) as better predictors of policy outputs than such process variables as interparty competition, voting behavior, or legislative composition. This has been particularly true where systems theory has been used as the basis for developing statistical equations Without stretching credibility too far, then, we could adopt a semantic usage that equates input and output with case and effect.

In this context, we can work through a number of logical paradigms. Probably the first logical advance made by the systems theorists over the logic of the Greeks is the specification of intervening process variables between input-cause and output-effect. Basically, these process variables represent elaborations of how inputs are transformed into outputs. That is to say how education, for example, brings about increased lifetime earnings.

A second, and even more important logical advance of systems theory over ordinary cause-effect logic involves the construction of the feedback loop, which can be understood as the effect of effects upon causes. Not only does literacy, for example, lead to increased availability of newspapers, books and magazines because there are more readers available. The existence of these communications media also tends to generate further increases in literacy, as more people have greater incentive to learn to read. With these two derivations and the simplest logical relationships – cause-effect, effect-cause and effect-effect – we can conceive the construction of some relatively sophisticated input-output tables.

Such tables, however, are unlikely to have much immediate significance in social planning, so instead we may shift now to the frequently used communications paradigm: Who Says What to Whom By What Means and With What Effects? (Havelock, et. al., 1969) DeGrazia and Gurr have suggested that a derivation of this question could be used as the basis for investigating the entire social welfare system (De Grazia and Gurr, 1961, 1).

The most elementary model in which this paradigm is usually employed is the input-process-output model: *Who Says What to Whom?* By substituting the action of *doing* for the action of *saying* , we can logically introduce all behavior into the model: Who *Does* What to Whom? This basic question is a semantic reduction of the bulk of all social science research in such areas as planning, decision-making and related areas.

Etzioni has suggested another minor innovation to this model which logically introduces an evaluative component into the action: This is the Input-Process-Output-Outcome model, or Who Says (or Does) What to Whom *With What Effect?* This model is widely used today in Evaluative Research. A final consideration which might be added to the paradigm in a similar vein is the question of media or means: Who Says (Or Does) What To Whom With What Effects *And By What Means?"* Following up on the input-cause/output effect metaphor, each of these variants presents a potential set of applications of input-output analysis in a social context.

Further, various prior applications of these variations suggest chains of cause-effect relationships similar to those measured by an input-output table. Thus, diads, triads and other clusters in sociometric research fall within this pattern. Likewise research in communications, such as the diffusion of innovations and the two step flow of communications can also be translated into input-output contexts (Rogers, 1962; Katz and Lazersfeld, 1971).

Thus, we have seen that, subject to the methodological and data problems involved, the information theory paradigm presents one systematic way of applying input-output analysis to non-economic questions. Relying upon the suggestion by DeGrazia and Gurr that the paradigm of *Who Gives What To Whom?* can be employed

generally in social welfare research, we can now proceed to elaborate further a testable model.

An Application to Social Planning

Social planning was defined above as planning concerned with the general welfare. Welfare, for our purposes, is *the material and spiritual wellbeing of people* (Titmuss, 1963, 42). Frequently cited categories of welfare include individual and social welfare, occupational and fiscal welfare. Given the above definition, however, the term human welfare would appear to be redundant.

If social welfare is concerned with the general welfare, there would appear to be strong incentive for governmental social planning. If further rationale were needed, one could also cite John Stuart Mill's justification of the public sector: "There is scarcely anything really important to the general interest which it may not be desirable, or even necessary, that the government should take upon itself, not because private individuals cannot effectively perform it, but because they will not" (Mill and Ashley, 1965, 18).

The specific rationale for governmental action in social welfare is probably presented in typical fashion by James Dumpson's comments on the principles underlying the public assistance program:

1) "A society is weakened and the general welfare threatened by the existence of misery, deprivation and want."
2) "Effective functioning of a democracy requires that everyone contribute to, and share in, the general welfare."

On the basis of the model outlined above, it would appear that the task to which social planning is to be applied involves answering the welfare question of *Who gives material and spiritual well-being to whom and by what means?* Clearly in the United States, there is a division of welfare-labor and particular answers to this question are supplied by a great multitude of different organizations and institutions. The family, for example, plays an important role in the provision of welfare. Our focus here is based on the assumption that in modern, urbanized and industrialized democratic systems like the United States, the provision of welfare is a major function of government.

One of the first characteristics of government which must be taken into account in considering the governmental welfare function in the U.S. is the federal character of American government, which is usually divided into branches – executive, judicial, legislative and bureaucratic – and levels – federal, state and local. This kind of complex social structure (which, incidentally is mirrored in the social organization of the voluntary sector to a considerable degree) is virtually unrecognized in the

literature of governmental social welfare and the welfare state. A possible explanation for this lies in the role of unitary states, including Great Britain and Sweden, as innovators in public social welfare.

There are in the United States today 50 states, thousands of municipal governments, countless multijurisdictional and regional special districts, and over 80,000 organizations in the federal government alone. (This estimate was made by Edward Newman in a mimeographed document, "Expenditures for Public Welfare: The Budgetary Process" available in the Heller School library.) The system takes on its federal character due to the fact that each of these entities has some degree of autonomy and independence to act. We are concerned with them because each is in some sense concerned with the general welfare, and probably at least a majority of have some involvement in social welfare.

This mélange of organizations and the interests they represent result in an incredibly complex system for the planning and delivery of social welfare. Yet we can introduce some simplifying generalizations through the use of the logic of input output analysis. First, all of these organization are public in the sense that their activities and programs are supported by public tax funds. Secondly, although the patterns of interaction displayed by actors in these contexts probably come close to illustrating every known variety of human behavior, two types of action appear to be particularly pertinent. These are coordinative activities such as cooperation, competition and conflict and exchange activities including *quid pro quos* and gifts, or unilateral exchanges.

Further, the structure of organizational units beyond the level of the individual is principally of two types: hierarchical forms, such as bureaucracies like HEW made u of many individual organizations hierarchically arranged; and equalitarian forms, such as bargaining clusters of community social service organizations.

Daniel Elazar, the foremost contemporary student of American federalism, has defined the pattern of relationships between levels of government as cooperative federalism, or the patterned sharing of activities and functions (Elazar, 1968, 53-67). This suggests a bargaining relationship between levels of government, as opposed to a hierarchical relationship implied in the notion of dual federalism, or separation of powers. Among the manifestations which Elazar suggests are traits of this type of system are three that are important to the social welfare function: routinized legislative interference in administration; regular intergovernmental consultation; and a system of grants in aid from higher to lower levels (Elazar, 1968, 55).

From the perspective of economics, Paul Samuelson suggests three economic roles of government: expenditure, regulation and finance (Samuelson, 1961, 177-194). Both of the first two items in Samuelson's list are important in social welfare. However, our focus here is principally on the first – the expenditure of public funds, for this phenomenon is highly revealing with regard to the insight it lends into some

of the activities mentioned above. In short, the answer to the question of who gives material and spiritual well-being to whom can frequently be answered in terms of the spending patterns of governmental units.

In this way, we have produced a relatively simple list of elements from which can be constructed the theory underlying an input-output table of governmental social welfare activity: Governments expend resources for certain purposes nd the resultant money flows are indicators of that expenditure. This is, in turn, an indicator of the purposes those government are, in reality, pursuing. Thus, the flow of grants-in-aid, for example unless they are explicitly of a "no-strings" revenue sharing variety, represent also the flow of purpose between levels of government, or what we might call *policy flows*.

In constructing such a table, we can rely on the method suggested earlier in this paper of using a closed set of indicators in representation of empirical reality. In this case, the closed set of indicators is the dollar flow of public finance. Taxes are collected from the population, appropriated by legislatures, expended by various public agencies and result in a distribution of benefits to the population.

Schematically, this can be represented as follows:

Taxpayers		Appropriations
Population		
Beneficiaries		Expenditures
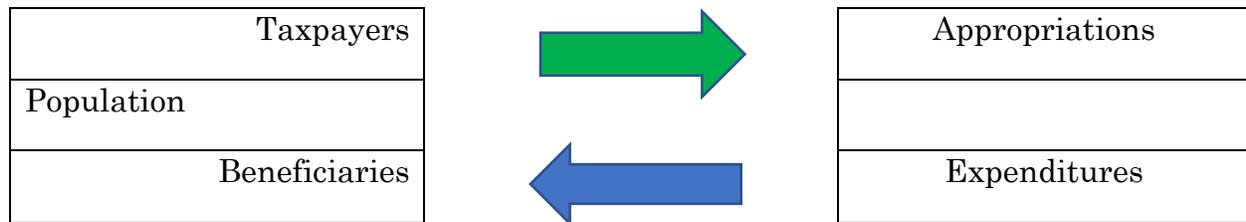
Each set of relationships in this process could be described in the cells of an input-output table, for in this case, cells resemble the general ledger of the agency, with inputs operationally defined as revenues and outputs as expenditures. While revealing the relationships between the outputs of the taxpaying population and the inputs to beneficiaries is a principal task of the study of redistribution in social welfare, it is beyond our investigation here. We are focused instead on the input-output flow of policy suggested by the grant-in-aid transactions between the federal government and the fifty state governments.

The actual conditions which are to be described by these indicators suggest a basic matrix of nine cells which can be aggregated or disaggregated at will. The three cells would be population, government and other social welfare institutions. The first of these is theorized to form an integral category on the basis of DeGrazia and Gurr's suggestion that all welfare begins and ends with individuals. The second has already been discussed and can be aggregated or disaggregated using the elements

mentioned. The final category is admittedly a residual category at this point, although future investigation might elaborate it and give it definition in the input-output context.

The basic table, then, would look like this:

Outputs				
Inputs		Population	Government	Other Institutions
	Population			
	Government			
	Other Institutions			

The initial investigation which I contemplate would involve disaggregating the government cell on two bases. First, it could be divided into federal, state and local units yielding a table of five, rather than three cells each way. Secondly both the federal and state cells would be subdivided. The federal division could be on two bases – either the organizational units listed in the government organization manual or the program categories listed in the federal budget. Division of the states cell would initially be into the 50 separate states. Thus, at this level of disaggregation one would have a table of approximately 60-80 cells. Using the data, most of which is available, in the form indicated above, it should be possible to construct a full input-output table that would predict the states which would most probably be affected by changes in federal policy measurable in changed expenditure patterns.

Conclusion

Because of the nature of the task undertaken, this paper does not involve the distillation of testable hypotheses from existing bodies of literature. Rather, it involves a somewhat eclectic search for a basis upon which to apply the technique of Input-Output Analysis to social planning. The major steps in the process to constructing such a table are several and tenuous:

First, it was observed that the Leontief table represents a closed set of indicators in a state of equilibrium which by inference describe and explain

aspects of empirical reality which do not necessarily exist in a state of equilibrium.

Second, the problem of the effects of intergovernmental activity in social welfare, particularly the sharing of policy flows through categorical grant-in-aid programs was posed as a problem subject to Input-Output Analysis.

Finally, a table was constructed of three cells – population, government and other institutions – as the most general appropriate answer to the welfare question posed as Who Gives What To Whom?

On the basis of this theoretical formulation, one can begin to broach some of the methodological problems of this application, such as availability of data.

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