

## Community Values, Social Measurement, and Transportation Policy

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What questions can we ask about a community's values that would be especially pertinent to its transportation policy? Some questions seem to have a *prima facie* relevance: Do the citizens prefer auto, bus, or rail transport? Are they willing to disrupt a stable neighborhood to construct a new freeway? What are their attitudes about air pollution? Are they concerned about how long it takes them to commute to work? About the safety of their mode of transport?

But the answers to these questions, even if relevant, would not be very useful to the urban transportation planner. Often the answers that would be obtained are obvious beforehand: Other things being equal, the citizens of almost any community would prefer clean air to polluted air, safe and speedy transportation to that which is slow and dangerous. It is not immediately obvious whether the citizens of a community would say they preferred auto, bus, or rail for urban transport, or whether they would be for or against a new freeway through the inner city, but even here their answers would tell us very little. Whether they preferred auto, bus, or rail would surely depend on the service they thought each mode would provide for them, and on how much it would cost: the same person who would insist on using his car to commute in Orange County would probably take the subway if he lived and worked in Manhattan. Whether they would support construction of a new freeway through a stable neighborhood would often depend on whether they lived in the neighborhood or had to drive through it, or on the seriousness of the existing traffic problems and the number of persons who would have to be relocated.

One reason that answers to the foregoing questions would not be very interesting is that they would have to be fundamentally qualitative, whereas information the planner needs to have about community values is inherently quantitative. Although we know that, other things being equal, the normal healthy citizen prefers clean air to pollution, and speed and safety above slowness and danger, we usually do not know how important—how much he would be willing to give up to get—a given improvement in air quality or speed or safety of travel is to him. And as planners we have a need to know, for otherwise we cannot hope to know how much money, community stability, or whatever is worth giving up to get a given improvement along any of the dimensions we have discussed. The quantitative character of the answers the planners need to have also shows up when there is a choice among different modes of transportation. Surely the typical citizen is fundamentally interested in the relative speed, comfort, safety, convenience, and cost of alternative modes of transportation (i.e., in quantitative comparisons of their performance), rather than in the mode itself. It is no doubt true that some people love their automobiles, or use them partly as status symbols; but would automobiles be loved or used as status symbols in a society in which they were of no use?

Another reason why the answers to the foregoing questions would not be very interesting is that they would depend on the conditions with which each respondent happened to be confronted, and would therefore have no general applicability. Very small amounts of pollutants escape our attention and spare our health; sufficiently heavy levels will oppress our senses and shorten our lives. A faster commute will not matter much if it takes us 5 minutes to get to work, but it will matter a good deal if it takes an hour. The basic point is that the value an individual places on a given improvement, or the extent of his concern about any retrogression, will depend on where he stood along the relevant dimension. In general, an individual will place less value on additional units of a good or service if he already has a good deal of that good or service than if he has very little. (As Kenneth Boulding puts it in his paper in this volume, "We do not have a single 'value' for either [good] A or [good] B; what we always have is a value sys-

tem that consists of different values for A and B depending on how much we have of either of them.")

The upshot of all this is that it is, in general, impossible to get the quantitative information on values a transportation planner could use without first determining how much the individuals concerned already have of whatever objective is at issue.

We shall accordingly have to turn now to the problem of measuring the extent to which a community has been provided with the things it values.

### SOCIAL INDICATORS

There is one area in which we have a reasonably satisfactory measure of how much we have of what we value. That is the area covered by the National Income and Product Accounts, from which we obtain the statistics on the National Income and similar measures of the output of the economy. The figures on the National Income are probably the most impressive and elaborate type of socioeconomic measure that we have. Although over any given year the output of thousands of different types of goods goes up, and the output of other types of goods goes down, the National Income provides a meaningful aggregate measure of how much the market economy has grown or declined on balance. Although it comprehends a vast variety of phenomena, it is sensitive enough to reveal even the mild recession or the slow advance.

Most importantly, the National Income statistics also provide what the economist tends to call a measure of "welfare", that is, an indication of how "well off" we are. Thus the rate of growth of the National Income is often relevantly cited in assessments of how well or badly a given administration, country, or economic system has been doing.

Yet, for all their virtues, the National Income statistics do not tell us many things we need to know. They leave out most of the things that make life worth living. They leave out the learning of our children, the quality of our culture, the advance of science, the compatibility of our families, the liberties and democratic processes we cherish. They neglect the pollution of the environment, the deprivations of crime, and the toll of illness.

They even misconstrue or neglect many values that can readily be measured in monetary terms. When the criminal buys a gun, or the honest citizen buys a lock, the National Income rises. When a new highway is constructed near a residential area, the expenditures on that highway add to the National Income; but so do the expenditures on air conditioning of those nearby residents who can no longer bear to keep their windows open because of the noise.

The most notable limitation of the National Income statistics is that they do not properly measure those "external" costs and benefits not fully reflected in market prices. They neglect or misstate the costs to society of those actions, such as the generation of pollution, which do not show up in the expenses of the offending firm or individual. They similarly neglect or misstate much of the benefit to society of those undertakings, such as basic scientific research, which do not bring the sponsor's profits proportional to society's gain.

If some of our actions bring burdens or benefits to others, but these burdens or benefits are not reflected in the prices we pay or receive, then we have, as individuals, no incentive to take them into account. We have no incentive to curtail those activities that bring losses to others, but no cost to ourselves; and no incentive to undertake activities that bring a gain to society, but no reward in the marketplace. These activities must therefore normally be carried on by governments. The "external" costs and benefits that the National Income statistics leave out or misstate are thus of special importance for public policy.

The aspects of our welfare that the National Income leaves out are particularly important in cities. As population has grown and urbanization increased, a mainly new type of interdependence has emerged, which rarely existed in the rural environment. If a frontier farmer should leave his garbage in his yard, it would be nobody's business but his own. But if the urban resident does this, there is a problem for the whole neighborhood. The frontier community did not need to worry about pollution, but the modern

megalopolis does. Zoning laws are relatively unimportant in the country, very significant in the city. The general point is that in a rural society, there is only limited interdependence, apart from that which is automatically coordinated by the market system, but in a crowded city a man's actions directly affect the welfare of others in ways that do not show up in the National Income statistics.

If developments that escape measurement in the National Income statistics have a direct impact on our well-being, especially when we live in large cities, and are usually also a particular concern of public policy, there is a serious need for statistics on these developments. There is, in other words, a need for measures of how much people have of those things they want that they cannot get in the marketplace, and that accordingly are not properly measured in the National Income statistics. Such measures are, as we saw earlier, also required before we could hope to learn much that is interesting about community values.

Unfortunately, the statistics needed to complement the National Income and Product Accounts, and allow broad-gauged measurement of community values, rarely exist. In these areas of public or social concern, the only kind of statistical information that is generally available is that which relates to the expenditures and activities of governments. Why is there this imbalance in the supply of "social" information, which tells us what resources the government is using but not about the severity of the problems it deals with or what progress it is making in solving them?

This imbalance in the supply of information on public problems is owing in large part to the fact that the normal routines of government demand a considerable amount of information on how much a government spends for each purpose, on what types of resources it uses, and on the activities it undertakes, whereas there is no routine requirement for information on national problems or accomplishments. There are always accountants who ensure that government funds are not misappropriated, supply and personnel officers who keep track of the resources the government uses, and public relations experts who publicize each agency's activities. Governments thus produce information about their own activities as a by-product of everyday operations, but there is no such automatic provision of information about the society's problems, or whether we are making any progress in dealing with them.

Plainly, information about the activities or expenditures is not what we need to begin to measure community values. To begin to achieve that purpose we need information about the condition of our society; about how much children have learned, not about the time and money used for schooling; about health, not about the number of licensed doctors; about crime, not about the number of policemen; about pollution, not about the agencies that deal with it. It is true that increased expenditures on some social problem, or an increased number of teachers, doctors, or policemen, and the like, are often taken as measures of progress in solving social problems, but they are usually grossly misleading measures. We would surely be better off if we could manage to deal with a social problem with less cost—if we could get as much learning, health, and crime prevention with fewer teachers, doctors, or policemen. All these resources are scarce, and could also make a contribution if they were used for other purposes—in some cases more of a contribution than they make in the area where they are used as measures of progress.

The sort of statistics that the foregoing argument has attempted to show are badly needed, but usually lacking, and are defined as "social indicators". Social indicators are statistics of direct normative interest. In the language of the economist, they might be called measures of "welfare" or "illfare". The National Income statistics provide a prototypical social indicator, because they provide a measure of how much we have of the goods and services we seek through the marketplace.

My emphasis on the need for social indicators, both for better public policy and broader measurement of community values, is due in part to my experience with "Toward a Social Report," a preliminary study of the condition issued by the federal government in January 1969 (1). Since I had immediate responsibility for the preparation of this report, I could not but be impressed with the lack of information, beyond that contained in the National Income statistics, on how "well off" the American people were. "Toward a Social Report" exploited practically all of the social indicators that are now available

at the national level, yet in many cases had to rely on "proxy" measures, or simply point toward the sort of information that was needed.

At the level of the city or community, the lack of social indicators is even worse (and also, because sample size does not decrease with the size of the population, relatively harder to finance). Even so, there is a need for social reports on major cities and metropolitan areas. Such reports not only would encourage the collection of needed social indicators, but also would be a step toward policies that would better serve the community values. They would at the least provide visibility to metropolitan problems and permit more enlightened public discussions about how these problems might be solved. They could ultimately also allow better judgments about community values and more nearly optimal policies for satisfying them.

### AGGREGATIVE INDEXES

If the point is accepted that we need measures of "welfare" and "illfare" in the "social" area that could complement the National Income statistics, it is natural to ask whether these newer social indicators could have some of the "aggregativeness" that helps to make the National Income statistics so impressive. As was indicated earlier, over any significant period of time, the output of some of the goods produced in a country increases while the output of other goods decreases. In a depression the output of glass jars for home preserves, or of contraceptives, may increase; during a period of rapid growth the consumption of cheaper goods may decline as people switch to substitutes of higher quality. Changing technologies and fashions also ensure that the tens of thousands of different types of goods produced in a modern economy do not show the same patterns of growth or decline. The extraordinary achievement of the National Income and Product Accounts is that they summarize this incredible diversity of developments into a single, meaningful number indicating how much an economy has grown or declined over a period.

The aggregation involved in the construction of the National Income and Product Accounts is so successful in part because relative prices are used to determine the relative weight or importance to be given to a unit of one kind of output as against a unit of a different type of output. If the number of automobiles produced has gone up by half a million since last year, while the output of potatoes has fallen by half a million bushels, we need to know the relative importance of these two developments before we can begin to make a judgment about the movement of the economy as a whole. It would obviously be arbitrary to determine the relative importance of these two developments by comparing the weight in pounds of an average automobile and a bushel of potatoes (though even an arbitrary approach like this might be better than no index of output at all). Thus the relative prices of automobiles and potatoes are used to weigh the relative importance of two such developments in the National Income and Product Accounts.

Relative prices at any given moment of time provide weights that are presumably meaningful in "welfare" or normative terms. This is because a consumer who rationally seeks to maximize the satisfaction he gets from his expenditures, in terms of his own tastes or values, will allocate his expenditures among alternative goods in such a way that he gets the same amount of satisfaction from the last dollar spent on each type of good. If he obtained more benefit from the last dollar spent on apples than the last dollar spent on oranges, he would obviously be better off if he spent more on apples and less on oranges.

The almost universal reliance on such aggregative measures of a society's income should not, however, obscure the dangers of failing to look behind the aggregates. Imagine these two cases: In one, the National Income remains constant over a year, and all of the industries have the same level of output over the year; in the other, the National Income also remains constant, but about half of the industries grow and the other half decline. Obviously, the first economy would be stagnant, whereas the second would be undergoing significant change, including presumably shifts of resources from some industries to others. We would not see the profound differences in these two hypothetical situations simply by looking at the aggregate figures for the National Income. We also have to disaggregate.

But disaggregation is not the enemy of aggregation—indeed, a consciously constructed aggregate is usually easier to break down into its components than most other statistics. A well-constructed aggregative statistic, like the National Income, can (in principle at least) be compared to a pyramid. At the base are the individual firms, sites of production, and individual income recipients. Just above are the industries and communities, and above them are the major sectors and regions. When the same goods are processed by several firms, double counting is avoided by counting only the "value added". At the top there is the National Income. Such a pyramid can usually exist only when there has been the consistent definition and procedure that aggregation requires, and this systematic approach probably facilitates disaggregation as well as aggregation.

The relevant point that emerges from an examination of the National Income and Product Accounts is that aggregation can be extraordinarily useful, and is compatible with the use of the same data in disaggregated form. The trouble is that the "weights" needed for aggregative indexes of "social" statistics are not available, except within particular and limited areas. It would be utopian even to strive for a Gross Social Product or National Socioeconomic Welfare figure that aggregated all relevant social and economic variables. We cannot assess every sparrow's fall, at least in any objective way. There would be no objective weights, equivalent to prices, that we could use to compare the importance of an improvement in health with a decrease in social mobility. We could in principle have a sample survey of the population, and ask the respondents how important they thought an additional unit of health was in comparison with a marginal unit of social mobility. But the relevant units would be difficult even to define, and the respondents would have no experience in dealing with them, so the results would probably be unreliable. Thus the goal of a grand and cosmic measure of all forms or success of welfare must be dismissed as impractical, for the present at any rate.

Within particular and limited areas, on the other hand, some modest degree of aggregation is now or soon will be possible. And even over a limited area, such aggregation can be extremely useful. The only puzzle is why this limited degree of aggregation was not attempted long ago. The possibilities for useful aggregation over a limited span can be illustrated with the following examples.

One aggregation index that is full of promise is an index of the population's health and life expectancy. When some diseases and disabilities are becoming more common, while others are becoming less common, and life expectancy is also changing, how do we come up with a single measure of the population's health? How do we weight the importance of the disease that is becoming more common with the disease that is becoming less common? Happily, a useful index can be obtained by calculating the "expectancy of healthy life", that is, the "life-expectancy-free-of-bed-disability". This weights each disease or source of disability in proportion to the number of days it keeps a person in bed. If there is either a reduction in bed-disability due to a reduction in disease, or an increase in life expectancy when bed-disability is unchanged, the index will increase, as it should. The actual values of this index for the United States are given in "Toward a Social Report" (1), and they show no clear improvement in the nation's health since 1958. Admittedly, this aggregative index is, like the National Income statistics, imperfect in a number of respects.<sup>1</sup> Withal, it offers a far better measure of our condition of health and life than we have had before.

Another area in which limited aggregation is possible is that of crime. Plainly, some crimes are regarded as more serious than others. Thus a true index of crime would not, like the total of "indexed" offenses listed in the Uniform Crime Reports of the FBI, weight all relevant offenses equally. If the murder rate went down, and the rate of

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<sup>1</sup>It does not deal with the disability that does not force people to bed. Although it weights the serious disease more heavily than the lesser disease, since the serious disease more often results in death or in longer bed-disability than the minor disease, it makes no allowance for the difference in pain and discomfort per day among various diseases. Finally, it ranks death and permanent bed-disability equally, which may not be in accord with our values.

larceny went up by a like percentage, a mere total of offenses would tend to show an increase, since larceny is more common than murder. But a murder is more serious than a larceny, so the crime problem might in fact have become less serious. There is therefore a need to weight each type of crime by some measure of its seriousness.

These weights must be different when we focus on the degree of culpability or criminality than when we consider the harm done to victims. The weights for an index of culpability or criminality can be obtained in at least two ways. One way is by taking average length of prison sentences of each type of crime, as determined by statutes or judges, as a measure of the seriousness of the crime. Another way is by asking a sample of respondents to compare the seriousness of different offenses quantitatively. If a given offense is arbitrarily given a certain numerical value, they can provide a cardinal scale of seriousness by giving their estimate of the seriousness of other offenses in relation to the given offense. Several studies of attitudes on the relative seriousness of different crimes have been conducted, and they reveal a remarkable consensus about the relative severity of different types of crime among different classes and groups. The results of the best-known of these studies are highly correlated ( $r^2 = 0.97$ ) with data on average prison sentence by type of offense.

When the focus is, by contrast, on the harm done to victims, the appropriate weights for thefts are immediately evident from the dollar values stolen, but the weights to be attached to harm to the person can be only roughly estimated.

Unfortunately, the only currently available national information is on offenses reported to the police, and since the proportion of all offenses that are reported to the police varies from time to time and place to place, this is not a satisfactory source of offense data. The offenses listed in the Uniform Crime Reports are, moreover, not classified with enough detail to make it possible to compare their relative seriousness. There is, accordingly, an urgent need for regular sample surveys of the population, asking what offenses, if any, the respondents have been the victims of. If the offenses are appropriately defined and classified, they can be given weights corresponding to their degree of culpability, to obtain an index of criminality, or to the harm suffered by victims, to obtain an index of victimization.

Even the degree of aggregation that is possible in the areas of health and crime is practically out of the question in many other areas. And even where aggregation is possible, we may, as said before, need disaggregation even more, because of the importance of detailed information, and because disaggregation often gives us a greater chance of relating variations in a social indicator to the factors that cause it to change.

The possibility of aggregating social phenomena that do not have a market price is nonetheless very important to any discussion of the measurement of community values. It will be practically impossible to make general and regular use of information on community values unless this information is capable of being summarized, at least to some degree. If there is nothing approaching consensus, even on which points are important, the results of any valid inquiry into a community's values will overwhelm the capacity to store and assimilate information. In such a case, moreover, the phrase "community values"—indeed, even the word "community"—can have little meaning. Any uniform, community-wide public policy will be unpalatable to most of the citizenry. If, on the other hand, there is some degree of agreement in a community (such as was revealed in the discussion of the seriousness of different crimes), then some meaningful aggregation of social information will be feasible and when such aggregation is feasible we can meaningfully assess some general changes in social conditions in terms of community values.

## EVALUATION

When the social indicators measuring a given area of social concern are available, it is then, in principle, possible to make interesting quantitative statements about a community's values.<sup>2</sup> Once the amount of a given social good, or the severity of a given

<sup>2</sup> I here neglect some important problems involved in aggregating individual values into a social welfare function, which Kenneth Arrow has brought to our attention, because I do not think a discussion of these problems would further the discussion here.

social problem, is known, it begins to be possible to determine how much value individuals place on a unit change in the social indicator, because we can then hope to take account of the effect the existing level of a given social good or evil has on the evaluation of a change in it.

According to the conventional wisdom in some quarters, the value of such a change cannot be specified, even approximately, in monetary terms. Some social goods are so precious to the community, so it is said, that it would be absurd to put a dollar value on them. This sort of argument is appealing on superficial examination, but cannot withstand scrutiny. Whenever the community allocates its resources to one goal or another, it implicitly or explicitly trades off movement in the direction of one goal against movement in the direction of the other goal. A community's resources are fungible, at least over the long run, and can be used by the people in the community to buy private goods in the market, or seek this or that social goal through some collective mechanism. No rational decision about the allocation of resources between one type of purpose or another would be possible if no judgment about the relative importance of these purposes could be made. The statement that a social purpose is so important it cannot be measured in monetary terms is therefore logically equivalent to saying that all of a community's resources should be devoted to that social purpose.

### DEFINING OBJECTIVES

Now, let us for a moment assume that all the desired social indicators were available, and that community values were also so well known that the value to be attached to a unit change in each social indicator was known, even in exact dollar terms. Would all this information provide an adequate basis for rational choices among alternative public policies?

Clearly, it would not. We also need to know which social policies would be most effective in achieving the community's ends. Some policies might be intended to bring improvements of the kind the community would value most highly, yet be ineffective. Other programs might have a positive effect, but use up so much resources that they would not be worth their cost. To make confident choices among alternative policies, we need to know not only how much value the society places on each social objective, but also the quantitative relationship between the resource inputs and the social outputs, and have an inventory of the available resources as well. As Kenneth Boulding's essay in this volume says, it has long been clear that "actual choice depended not only on the value system but also on the opportunities that were open."

The need to compare the value a community places on a particular public objective with the cost of attaining that objective (that is, with the satisfaction of community values that would have been attained by using the same resources in another way) is particularly emphasized in the Planning-Programming-Budgeting (PPB) system. Since the PPB system has been recommended as a method that can help planners decide on transportation policies that take better account of community values and resources, and has been used to some extent in the U. S. Department of Transportation, it will be helpful to look at some features of this system before turning to the relationship between community values and urban transportation policy.

The PPB system typically focuses on the budget of a given agency or department. It is designed to facilitate better decisions about how the moneys in that budget should be spent, and about how large that budget should be. The most elementary step in PPB analysis is reclassifying the budget of the agency or department in question. In the past, government budgets were classified only in terms of appropriation categories that reflected mainly legislative and administrative history, and, at a lower level, also in terms of the particular resource inputs that were used. PPB analysts attempt to classify budgets also in terms of the objectives they are to serve. Thus, in the Department of Defense, PPB analysts classified the budget in terms of the goal of deterring strategic nuclear attack, the goal of limited war capability, and so on, which contrasts sharply with a budget classified in terms of traditional distinctions such as Army vs Marine Corps, or in terms of types of resources such as personnel and equipment. When the expenditures of an agency or department can be examined in terms of the purposes they

are supposed to serve, it is possible to think more relevantly about whether the allocation of the available resources is consistent with social or community values, and also possible to study the relative cost-effectiveness of different public programs.

An optimal choice of public policies plainly presupposes a quantitative knowledge of the cost-effectiveness of public programs. Unless we know how much good a public expenditure under a particular program does, we cannot know whether or not public purposes would be better served by shifting that expenditure to some other program or purpose. The PPB system accordingly calls for intensive efforts to determine what the output of each public program is, and/or attempts to specify this output with as much quantitative specificity as possible.

Advocates of the PPB system are, to be sure, not alone in calling for better evaluation of the effects of public programs. The most perceptive policy-makers must always have appreciated this need, which in recent years has been widely accepted by many people who know little of the PPB system. This recent widening of interest in the measurement of the output of public programs, is, however, almost certainly due mainly to the effect the PPB system has had on the level of debate about efficiency in government. If the PPB system had no further consequence than this, it might still have been worthwhile.

The idea that it is practically useful to specify the kinds of information and types of reasoning needed to attain an optimal allocation of resources, even though it is obviously impossible to achieve a perfect allocation of resources in the real world, is important in itself. A statement of the necessary conditions for an optimal use of resources provides a clear picture of the type of information we need, and forces us to think more carefully about our alternatives. The concept of optimization has proved useful not only in the PPB system, but in economic theory and operations research as well. Indeed, the PPB system inherited the optimization approach from economic theory and operations research.

The PPB system can even usefully be conceived as a step in the evolution of the application of the optimization approach to problems of the public sector. In a sense, the first application of the concept of optimization to public decision-making was through operations research. Operations research, in one form at least, began in Great Britain in World War II, when some scientists and mathematicians applied their mathematical skills to the solution of some narrow and well-defined tactical military problems. As operations research has advanced since then, it has become increasingly clear that it involves optimization—that is, requires that the outcomes of alternative courses of action must be compared in terms of some criterion of desirability, so that the "best" solution (in terms of the values of those who make the decision) can be chosen. (As Mantel and Dean's article on "Community Values and Operations Research" in this volume puts it, "Specifically, the function to be optimized must contain a set of measurable objectives and a set of weights that scale the individual objectives by relative importance.")

A major shortcoming of at least the earlier attempts at operations research (operations research as Mantel and Dean conceive it is so broadly defined that it merges into systems analysis, and thus generally avoids this shortcoming) is that it involves "sub-optimization". Suboptimization involves finding an optimal solution to a narrow or tactical problem without considering the relationship between a given solution to the particular problem at issue and other problems of society. Thus an operations research technique might be used to improve, say, the efficiency of a given bomber force, but would neglect the question of whether the task the bombers performed would be better done by missiles, or even by a more pacific foreign policy, and ignore the effect of the bomber force operations on, say, civilian air traffic or the effect of bomber bases abroad on foreign policy problems. Operations research can then neglect the greater gains that could sometimes be obtained by applying the optimization approach at a higher level, and even sometimes make the whole worse by making the part better.

The PPB system can perhaps best be seen as operations research applied to broader problems than those that operations analysts had been tackling, so that suboptimization would be less severe. Instead of looking at a narrow or tactical problem, the PPB analyst would look at the purposes and budget of an entire agency or department of



government. The PPB system was developed in part at the Rand Corporation, which had done a good deal of operations research for the Air Force, and was first applied in the U. S. Department of Defense.

When the PPB system later came to be applied to the domestic agencies of the federal government, as it has been since 1965, a new problem emerged. In the case of defense, state and local governments and the private sector do not share major responsibility with the federal government. But they do share responsibility with the federal government where social programs are concerned. Education, for example, is supported not only through the U. S. Office of Education, the Job Corps, and the training programs of the Department of Labor, but also (and on a much larger scale) through local governments, the efforts of parents, private employers, and even the television screen. The progress made in dealing with almost any basic domestic objective depends not only on some particular department of the federal government, but also on other departments, a host of state and local governments, and the private sector.

This means that the PPB system, which now operates mainly on a department-by-department or agency-by-agency basis, cannot by itself provide all of the analysis that is needed for rational policy-making. It can usefully analyze many social programs but cannot, as presently constituted, take sufficient account of the interdependencies among different levels of government or different sectors of the society. PPB analysts have recognized this, and there have been a few hesitant steps in the Bureau of the Budget to apply the PPB system across the whole range of federal government programs. But this cannot be sufficient, even in principle. To obtain a balanced assessment of national policy, we must take account not only of the federal government, but of the whole social system.

#### OPTIMIZATION APPROACH

The need to consider the whole range of social mechanisms for achieving an objective is particularly clear in the case of highway and transportation policy in urban areas. If planning focuses on a given highway project or budget, and simply seeks the best free-way for the money, it is particularly likely to suffer the most severe shortcomings of suboptimization. There are several reasons for this.

First, an improvement in a particular highway could make the whole city auto traffic system worse, because a better road at one point could cause extra congestion at another, thereby slowing up people who had different origins or destinations and used different routes. This means, of course, that the optimal expenditure of state and federal highway moneys depends on the street pattern and plans of the municipalities in a metropolitan area.

Second, even an optimal expenditure of all relevant budgets for streets and highways could be unsatisfactory, for it might be the case that some of these moneys should be spent for some mode of transport other than the automobile.

Third, it is possible that even an ideal expenditure of all transportation funds, irrespective of mode (which would mean budgets that were not "earmarked" for any one particular mode), would not ensure an appropriate policy. The decisions that communities and individuals make about zoning, lot size, proportion of multiple-family dwellings, height of buildings, and locations of industries, offices, and shops can be inappropriate, and create a demand for more transportation than would be needed with better spatial arrangements. Since the transportation system not only is affected by locational and land-use decisions, but also in turn affects those decisions, this interdependence is especially important.

Fourth, even an optimal expenditure of all transportation budgets, combined with ideal patterns of location and land use for industry and residence, might not be satisfactory. Many of the costs of urban transportation do not show up in the budgets of transportation authorities, or even in the time and travel expenses of the citizenry, but rather in the form of polluted air or disrupted communities. If I have judged the program rightly, it is these latter, non-budgetary costs that are the particular concern of this Conference. And well they might be, for they can be decisively important.

Where does this leave us? Some might say that urban transportation problems are so complex that systematic, optimizing approaches are of no use. And the textbook variety of PPB system, clearly, is focused too exclusively on budget costs to provide the ideal environment for all urban transportation analysis.

But to ignore the logic of optimization, and the need for systematic quantification, can only lead us backward—backward into conventional wisdom and thoughtless maxims, such as "cut down on the use of automobiles in urban areas whenever possible", or "no freeways whatever through urban slums", or "the automobile is our basic form of transportation and nothing should stand in its way". These maxims ignore the fact that every situation tends to be at least quantitatively different from every other and therefore lead us astray. However difficult the task may be, we must try to analyze each system of urban location and transportation with as much care and quantification as possible.

What is needed is what might be called a "complex systems analysis" that would take account of movements in all of the relevant social indicators in a metropolitan area. This broader systems analysis would use the optimization approach, and thus be a logical extension of the PPB system, rather than a system in opposition to it. It would be to PPB what it was to early operations research. It would not hope for quick or striking results, because broader problems are more difficult than narrow ones. But it would recognize that policy decisions must be made each year, and that these most difficult problems must accordingly be tackled now.

The social reports on particular metropolitan areas that were recommended earlier could be the first steps toward the needed complex systems analysis. Your cities, just as social reporting at the national level, can promote such analysis for the society as a whole. If metropolitan social reports were attempted, and conceived in the way explained, they could ultimately help bring about transportation policies more nearly in keeping with community values.

#### REFERENCE

1. U. S. Department of Health, Education and Welfare. *Toward a Social Report*. U. S. Govt. Printing Office, 1969.

## Discussion

### John Stone

I am a local urban renewal administrator. I hoped that the federal office principally concerned with developing social indicators and a report on the state of the art would say that the state of the art is such that there are some indicators that we can work with. I am deeply depressed to find that the state of the art does not produce a methodology that is more than tentative. There is the sense of urgency in my situation that cannot afford to wait for the scientific solution to begin to deal with values. From where I stand, I do not know what kind of a revolution is going on, but some kind of revolution is going on out there.

I have an information system, too, that is not scientific; it is political, and it is immediate, but it is very articulate and I am getting a lot of information out of it. It says something about values and about social indicators.

### Mancur Olson

Well, I am saying there is no way to have a completely or a fully rational policy in the absence of better information. One has to be satisfied with policies that are very likely to be, in important ways, unsatisfactory when one simply lacks the information to know what a more satisfactory policy would be.

I suspect that the individual planner or political leader must simply go out to the particular communities where he has responsibility and, in these communities, look around him and make, shall we say, a somewhat intuitive judgment as to the situation that prevails and as to the extent to which his program, or a hypothetical program, would influence that situation. In other words, I do not see any way of making policy that is altogether satisfactory without the right information.

### Mattie Humphrey

The amount of information fed into federal programs, I think, has little to do with the rationality of the kind of programming. We have allowed profiteering to destroy people. This is irrational, but has been a built-in part of our system. Also, the supportive statistics of our programs—whether health, education, social work, or what not—tend to give abstractions about the situation rather than anything substantial about the learning. Then you want an additional layer of statistics that would give even more remote input. I, for one, feel you must look at the community as an organism if you are going to talk about anything in terms of a concrete wholeness.

Intuitively and analytically, I know that there are some things that you must do immediately. We can observe certain communities that have, as organisms, been pretty well killed. If we want to revive them there are some essential things that we can do now on the basis of present data. We could give the people living in those areas air rights for cooperatives or whatever they want to do with them. But I am sure you have other people in our metropolitan areas getting air rights where they have already displaced people. Also, when people are displaced for institutions, such as universities, the displaced people could automatically be given some use of those facilities. These are some of the immediate steps that could begin to reverse the present process.

We who live in affected communities know a great deal; we know the consequences of government programs. There are gross observations from large numbers of people. The information is available. The fact that you have not integrated it into your knowledge is something else again.

### Reverend Robert Howes

There are certain agreed-upon common goods within metropolitan areas. There are certain common bads that prudent men would have to agree we should collectively diminish. In this process there are certain burdens of our collective life in metropolis which, because they are tangible, must fall on certain sections and certain people in the metropolitan area—such burdens as, for example, public housing or atom power as a source of energy in our cities. Dr. Olson has suggested that we are never going to arrive at a solution to the problem of sharing these common burdens in the metropolis through a process of laissez-faire—through a jungle warfare of introverted neighborhoods with no holds and no cliches barred in which the prize goes to the loudest or at least to the neighborhood that has the greatest immediate political clout. . . . Each neighborhood fighting a freeway, or a single neighborhood fighting an incinerator or public housing, may not make the problem so immense that it cannot be dealt with but, if neighborhood after neighborhood resists an incinerator that prudent men can conclude is necessary, this can be a very serious thing.

The question arises as to whether such intermediaries as universities, churches, business organizations, and other such groups can and should be useful in trying to create a pragmatic information fund for the citizens in our beleaguered cities. . . . I may be wrong in suggesting that there has to be some kind of metropolitan morality in which single places and single groups are willing to accept certain immediate inconveniences in the light of a larger common good. But whether there is a metropolitan morality or not, that there be a pragmatic acceptance of what is at least desirable may be subjectively perceived as a burden. . . .

### Alan Altshuler

Who is to define what gets measured when you have limited resources for measurement and how is one then to weigh the social indicators into program evaluations and social welfare evaluations? Where have the resources for advocacy planning come from in recent years to give groups that have been relatively weak in the political process an opportunity to make their inputs on the planning side in terms of developing alternative schemes and demanding that certain information that has not been collected in the past be collected now? It seems to me that, as we move toward developing a greater and greater informational base for our programs and policies, it is terribly important that we not leave this process solely to government or solely to the best organized and most powerful interest groups in the society. . . . One needs a pluralistic process of defining what is to be measured, what criteria of programs and of social welfare ought to be dominant in society. It is here that the universities, the churches, the various consulting organizations, the associations of the poor and so on have a great deal to say, and it is terribly important that they have a part of the process.