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URBAN TRANSPORTATION PLANNING

A Decision-Oriented Approach

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1984

McGraw-Hill Book Company

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make the final decision. The role of the planner thus becomes one of planning *with* the interested public groups and officials, rather than planning *for* a unitary general public, as in the rationalist tradition. As will be seen in the next section, however, the role and characteristics of a planning process depend very much on the type of decision-making approach that is assumed; and there is no clear consensus on what type of approach really exists in urban government.

3-2 CONCEPTUAL MODELS OF DECISION MAKING

One of the first difficulties in relating decision-making characteristics to the development of a transportation planning process is that there exist in all organizations and governments different levels of decision making, involving a wide variety of participants and often requiring different forms of information support. There are many differences involved, including (1) type, frequency, structure, and complexity of the decisions; (2) the characteristics, capabilities, and "needs" of the decision makers; and (3) the organizational and political context [Keen and Morton, 1978]. These differences make it very difficult to identify a single model of decision making that can be used to guide the development of a planning process. For the purpose of this discussion, we will focus exclusively on the characteristics of the decision-making process that occurs at higher managerial and political levels, as most transportation planning activity is focused on influencing these decisions.

There are five major conceptual models of decision making which emerge from past studies of the decision-making process. These models can be classified as (1) the rational actor approach, (2) the satisficing approach, (3) the incrementalist approach, (4) the organizational process approach, and (5) the political bargaining approach. Before these models are discussed, it is important to deal first with how they are interrelated and how they can be used.

The five decision-making models are based on the principles and concepts of two major disciplines—political science and management science. Because of their separate backgrounds, one must be careful in comparing the different models. For example, the incremental, rational, and satisficing models were developed on the basis of single-decision processes, while the organizational process and political bargaining models were developed to reflect the organizational and political settings within which decisions occurred. Even with these different backgrounds, however, there are several similarities between the models and their underlying assumptions. These similarities will be discussed in the following pages. It is important for the reader to understand that these models cannot be considered mutually exclusive from one another. Each model, however, should also be understood as a conceptualization of the decision-making process in a specific institutional environment. Thus, the models can be distinguished from one another based on the way in which the decision process is perceived.

The importance of these models to planners lies in their representation of common ways of understanding decision making. As will be shown later, different characteristics of the decision-making process imply different strategies for providing information

as input to that process. In some cases, such models might allow planners to introduce proposals into the planning process in terms tolerable to the participants whose underlying concerns are described by these different decision models. These models can thus provide a useful way to identify the important linkages between planning and decision making. More will be said about the use of these models in the concluding part of this section.

3-2-1 The Rational Actor Approach

As described in the preceding section, this model traditionally assumes a rational, completely informed set of decision makers whose decision process is based on maximizing the attainment of a set of goals and objectives. Modified versions of the rational model have relaxed some of the more rigid requirements of complete information and have developed a model of rational decision making that recognizes the limitations of decision maker's capability to digest information [March and Simon, 1958]. The rational model has most often been used in a normative sense (i.e., as a model of what decision making should be). Indeed, much of the effort in operations research, management science, decision analysis, and systems analysis during the past several years has adopted the "rational" logic of decision making. Thus, although there is very little evidence to support the validity of the rational model as a descriptive tool, it might still prove valuable as a means of formulating an analysis framework and of forcing "rationality" onto the political process [Keen and Morton, 1978].

The rational concept defines the logic of optimal choice; this remains theoretically true, even where it is descriptively unrealistic. Without the precision and formalism of rationalist theory, we would almost certainly have made less progress in developing descriptive insights. . . . For example, the concept of consistent, absolute utility functions has been invaluable in all theories of decision making, especially those that argue such functions are nonexistent.

A transportation example of the rational actor model is the decision-making structure established by Governor Francis W. Sargent of Massachusetts in 1970 to determine the future directions of transportation policy in the Boston metropolitan region. After a long and controversial public debate about the highway construction program in the region, Governor Sargent established a working group of transportation and community experts to analyze the options available to him in setting the direction of transportation policy in Boston. The study design document for this working group described the process in the following manner [Commonwealth of Massachusetts, 1970]:

Its aim is to advise the Governor and his Secretary of Transportation on whether and how to seek implementation on these projects, taking into account their feasibility and all their relevant impacts, together with those of alternative proposals that command substantial support within the region.

Where disagreement among the participants persists at the conclusion of the Planning Review, a well-developed set of alternatives will be presented to the Governor and Secretary, accompanied by a thorough analysis of the advantages and disadvantages of each.

This approach reflects quite closely the characteristics of rational decision making: the existence of clearly defined decision makers, a rigorous examination of alternatives, and a final decision dependent upon the goals and objectives of the decision maker.

With respect to the characteristics of a planning process designed to support rational decision making, this model probably requires the most structured and data intensive planning effort of the five models discussed here. The planning process would be structured to identify all feasible alternatives, to compare these alternatives along some set of evaluation criteria, and to rank them in order of preference with respect to defined goals and objectives. These tasks would, of course, require the development of analysis techniques to obtain the impact measures necessary for alternatives comparison.

3-2-2 The Satisficing Approach

Critiques of the rational actor approach have focused on its requirement for comprehensive knowledge and the selection of the "optimal" alternative. For most observers of decision making, these requirements are rarely satisfied. In this model of decision making, decision makers choose alternatives that satisfy some minimum level of acceptability or which induce the least harm or disturbance while conveying some benefit. The search process in decision making is thus best described as satisficing [Simon, 1969]:

We cannot, within practicable computational limits, generate all the admissible alternatives and compare their relative merits. Nor can we recognize the best alternative, even if we are fortunate enough to generate it early, until we have seen all of them. We satisfice by looking for alternatives in such a way that we can generally find an acceptable one after only moderate search.

Even in this model, however, the underlying basis for decision making is rational choice, although rationality is limited by the resources and ability of the decision maker to acquire and process information. This model of decision making has several important characteristics besides that of a satisficing search process [Simon, 1957; March and Simon, 1958]. These include (1) alternatives and consequences of action are discovered sequentially through the search process, (2) each action deals with a restricted range of situations and consequences, (3) decision making is goal-oriented and adaptive, and (4) decision makers will define a set of actions that can be implemented in recurrent situations.

A transportation example of the satisficing model is the selection of one particular alignment for an urban expressway, which, while assumed to follow the rational actor approach, is in fact a satisficing approach to transportation decision making. The number of alignments which could be considered is theoretically infinite, meaning that only a select few are even considered in the planning process. The alternatives considered and ultimately selected have to meet explicit or implicit levels of performance in terms of cost, travel times, traffic capacity, and environmental impact. The

final decision on an alignment, then, is a choice among relatively few alternatives based on the consideration of relatively few consequences of each. The first alternative alignment meeting the required levels of performance and surviving the process of public scrutiny will usually be the one selected, whether it is in fact the "optimal" alternative or not.

The type of planning process that would be effective in this mode of decision making is one where acceptable levels of performance are identified and used to develop a feasible set of decision alternatives. Because the satisficing model is still based on rational choice, information on the impacts of alternatives must still be obtained, although the evaluation criteria can be limited to a small set that are most relevant to the decision makers. Attainment of specific goals and objectives still drives the planning process.

3-2-3 The Incrementalist Approach

This model of decision making argues that decisions are made on the basis of marginal or incremental differences in their consequences [Lindblom, 1959; Braybrooke and Lindblom, 1970]. This approach is different from the rational model in that it presents a limited strategic approach (in both the total number of alternatives considered and in the estimation of their consequences), has a "means" orientation, is remedial in that it moves away from problems rather than toward predetermined objectives, and assumes limited coordination and communication among key decision makers. The characteristics of the incrementalist model are the following [Lindblom, 1968]:

1. Rather than attempting a comprehensive survey and evaluation of all alternatives, the decision maker focuses on only those policies which differ incrementally from existing policies.
2. Only a relatively small number of policy alternatives are considered.
3. For each policy alternative, only a restricted number of "important" consequences are evaluated.
4. The problem confronting the decision maker is continually redefined. Incrementalism allows for countless "ends-means" and "means-ends" adjustments which, in effect, make the problem more manageable.
5. Thus, there is no one decision or "right" solution, but a "never ending series of attacks" on the issues at hand through serial analyses and evaluation.
6. As such, incremental decision making is described as remedial, geared more to the alleviation of present, concrete, social imperfections than to the promotion of future social goals.

The incremental approach to transportation policy-making is evident in many situations where specific problems require the implementation of some form of traffic management strategy. For example, as a major artery in a downtown area begins to experience increased demand for transit service along with increased levels of vehicle congestion, it is common for traffic management policies to be implemented as reactions to the perceived problem. Parking and stopping regulations may be imple-

mented first to smooth traffic flow, followed by exclusive bus lanes, which may eventually be replaced by an exclusive transit mall. This evolution of traffic management policies for a single artery reflects the tendency of decision makers to react to an existing problem with policies differing only marginally from policies in effect.

The incrementalist approach raises serious questions about the appropriate role for planning given that, according to the model, decisions are made with limited information, time, and expertise; problem definitions usually vary between different levels of government; and the alternatives selected differ only slightly from existing policies and programs. At most, the purpose of planning in this decision-making model is to define those alternatives that differ marginally from the status quo and then provide information on the marginal differences between them.

3-2-4 The Organizational Process Approach

This model recognizes the fact that most individuals belong to organizations and that decision making is therefore influenced by the formal and informal structures of the organization, channels of communication, and standard operating procedures. Early work on this model of decision making focused on the importance of organizational goals in the choice process and on the bargaining among organizational members to satisfy their goals first [Cyert and March, 1963].

Decision making in the context of this model is consequently affected by the organizational setting within which it occurs. The importance of this context is found in three areas [Allison, 1971]. First, governmental action, whether it be in foreign or domestic policy, is the output of organizations. Decisions made by government leaders trigger organizational routines within the bureaucracy to implement them. Second, these organizational routines often define the "range of effective choice" open to government leaders. The alternatives considered by decision makers many times come from agencies or organizational units whose own perception of the scope and severity of the problem heavily influences the set of alternatives presented to decision makers. Finally, policies and programs can be successful only to the extent that the organizations responsible for their implementation have the capability of carrying out their responsibility. For example, the physical resources available to a department of public works can be considered a constraint against which proposals for public works action can be measured.

The organizational process model is particularly well suited to the transportation field because the actions of many of the organizations involved in transportation planning and implementation are guided by design standards (i.e., standard operating procedures). Highway construction, for example, must usually meet standards of lane width, clearance, sight distance, geometrics, and land acquisition. In fact, much of the public opposition to expressway construction that developed in the late 1960s can be related to highway design standards that required massive land acquisition and thus major disruption. The standards which had been developed for construction of intercity highways were not appropriate in an urban setting and led to significant conflict between the agencies trying to apply the standards and the citizens affected by the projects.

The role of planning in this model of decision making is to provide the necessary information on the alternatives being considered to organization decision makers. Perhaps the most important impact on planning of this decision-making model is the significance that implementation has in the overall program and/or project development process. Because organizations are critical for program implementation, understanding the capabilities, skills, and resources of implementing organizations is important information for decision makers when choosing among program alternatives [Elmore, 1978; Meyer, 1982].

3-2-5 The Political Bargaining Approach

This view of decision making argues that the decision process is pluralistic and that the large number of actors involved in a decision often have diverse goals, values, and interests, creating conflict and a subsequent need for bargaining [Allison, 1971].

Policymaking is therefore a process of conflict and consensus building. The advocate of a particular policy must build a consensus to support his policy. Where there are rival advocates or rival policies, there is competition for support, and all the techniques of alliance appear—persuasion, accommodation, and bargaining.

The important difference of this model from the rational actor approach is that the outcomes of this bargaining process are seldom “optimal” in any objective sense. The outcomes represent those aspects of the problem solution that the decision makers can agree on, with the more controversial aspects potentially ignored or left for future discussion.

Some have argued that the bargaining nature of the decision-making process represents a degree of power sharing among diverse interests that often leads to stalemate [Altshuler and Curry, 1976]. Others, however, have argued that the search for consensus (and thus the need for bargaining) is necessary for realizing the objectives of most political leaders and is the only effective strategy to follow given the existing form of government [Schlesinger, 1973].

The events surrounding a financial crisis experienced by Boston’s transit system in the fall of 1980 are a classic example of decision making as political conflict and bargaining. With the transit system on the verge of a shutdown because of insufficient operating funds, transit management, the unions, local governments, the state legislature, and the governor all blamed each other for the problems of the Massachusetts Bay Transportation Authority (MBTA). As a shutdown became imminent, representatives of localities refused to allocate any more property tax revenues to the system, while both the legislature and the governor were reluctant to use more state tax revenues for Boston’s transportation. Only after the transit system actually shut down for a day was a temporary solution formulated and a compromise reached, one which allowed the system to operate with emergency funds through the end of the year. A temporary solution was the only kind of response decision makers could agree on, while the more

controversial issue of completely restructuring the MBTA or its financing was not debated.

The role of planning in such a decision process is much broader than that for the four decision-making concepts discussed previously. The planning process should be designed to provide as much information as possible on the alternatives being proposed by the interest groups, which means that the analysis approach should be flexible enough to respond quickly to requests for information on alternatives that surface during negotiations. Also, the analysis should be sensitive to the issues likely to be raised by competing interests and incorporate as much information as possible in the evaluation results to clarify these issues.

As was illustrated by the five perspectives on decision making discussed above, there are several ways to look at the decision process. All of these decision-making models relate in some respects to one another. For example, in each model, some form of rational behavior is assumed to exist, although the rational actor, satisficing, and incremental models are clearly more dependent upon such an assumption than the other two. The organizational process model adds a sociological dimension to the perspective on decision making in that it argues that the results of decision making are really a product of the organizational context in which they occur. Finally, the political bargaining model introduces the political nature of decision making and the importance of power distribution.

The rational nature of decision making, as described in each model, is very much determined by whose goals and objectives are being considered. An important distinction needs to be made between "normative rationality," where societal goals and objectives are the focus of decision making, and "descriptive rationality," which recognizes personal goals and objectives and focuses on individual behavior. For example, the incremental model can still be understood as a rational model if one views the individual decision maker's objectives as the criterion of analysis. It might be perfectly rational to not spend much time on the decision or to feel that policy means are important as ends. Even in the case of the organizational process model, where the organization is viewed as a constraint on the "search" for alternatives, there could conceivably be individual decision makers trying to rationalize decisions within a set of organizational constraints.

The importance of these alternative perspectives is that they define, in many ways, the type and purpose of planning activities that would be most effective in each decision-making context (i.e., the matching of capabilities with decision-making conditions). The challenge to the planner or analyst is to determine which defining characteristics of a decision-making process make one conceptual model or a combination of models (and the consequent planning process thereby implied) the most relevant description of the decision process to be followed (see Table 3-2).

It is also important to realize that decision making is dynamic and not rigidly structured over time. Thus, in the same city but under different circumstances, alternative views of the decision-making approach might be appropriate. Once understood, these decision-making characteristics provide strong guidance on the type of planning information that is most useful and on the most appropriate structure for a planning process.

Table 3-2 Summary of decision-making models

Model of decision making	Rational actor	Satisficing	Incremental	Organizational process	Political bargaining
Decision-making behavior assumed	Alternatives are selected to attain some set of predetermined goals and objectives in a utility-maximizing manner.	The first alternative to meet some minimal level of acceptability is inevitably selected.	Decisions are made on the basis of the marginal differences in their consequences.	Decisions are highly influenced by organizational structures, channels of communication, and standard operating procedures (SOPs).	The decision process is pluralistic and is characterized by conflicts and bargaining.
All relevant alternatives are considered.	Alternatives are sequentially discovered. Decision making is goal oriented but adaptive in nature.	Both the number of alternatives and consequences which can be identified are limited, meaning only a small number can be considered.	Government action is the output of organizations. Organizational goals are important in the choice process, as members bargain to satisfy their own goals.	The large number of actors involved in decision making, with diverse goals, values, and interests creates conflict and a need for bargaining.	Outcomes of the process are not "optimal" but represent those aspects of a problem on which decision makers can agree.
Decision makers can attain a comprehensive knowledge of the impacts of each before making a decision.	The underlying choice is rational, but is constrained by available resources and the ability to acquire and process information.	There is only limited coordination among decision makers. Decision makers tend to focus efforts on policies differing marginally from those existing.	Operating routines define the range of alternatives open to decision makers.	Controversial problems or issues tend to be ignored or put off for future discussion.	Characteristics of the decision-making process assumed
used can differentiate accurately among the choices considered.	It is impossible to generate all feasible alternatives and to compare them.	Both the number of alternatives and consequences which can be identified are limited, meaning only a small number can be considered.	Government action is the output of organizations. Organizational goals are important in the choice process, as members bargain to satisfy their own goals.	Controversial problems or issues tend to be ignored or put off for future discussion.	Characteristics of the decision-making process assumed
ranked, and alternatives can be accurately among the choices considered.	Alternatives are sequentially discovered. Decision making is goal oriented but adaptive in nature.	Both the number of alternatives and consequences which can be identified are limited, meaning only a small number can be considered.	Government action is the output of organizations. Organizational goals are important in the choice process, as members bargain to satisfy their own goals.	Controversial problems or issues tend to be ignored or put off for future discussion.	Characteristics of the decision-making process assumed
"optimal" alternative can be selected.	Alternatives are sequentially discovered. Decision making is goal oriented but adaptive in nature.	Both the number of alternatives and consequences which can be identified are limited, meaning only a small number can be considered.	Government action is the output of organizations. Organizational goals are important in the choice process, as members bargain to satisfy their own goals.	Controversial problems or issues tend to be ignored or put off for future discussion.	Characteristics of the decision-making process assumed

Actions are remedial in nature, addressing present problems not future objectives.

Implications for the planning process

The planning process is highly structured and data intensive. The process consists of the following steps: (1) identify all feasible alternatives; (2) compare them according to evaluation criteria selected; (3) rank order the alternatives with respect to defined goals; and (4) select the "optimal" alternative.

Because rational choice is still involved, provision of information on the impacts of each alternative is still crucial, but the set of evaluative criteria is limited to those relevant to decision makers. Planners should identify and employ the defined acceptable levels of policy performance to develop a feasible set of alternatives.

Because the alternatives selected differ only slightly from existing policies, planners have to define those alternatives that differ marginally from the status quo and provide decision makers with information on the marginal differences. Little if any information on the impacts of other alternatives is required.

Planners should understand the goals and objectives of the organizations involved so that specific types of information can be incorporated into any analysis. Understanding limits to implementation is important to both planners and decision makers when proposing and choosing among alternative projects or programs.

Planners should have a broader role. An analysis approach flexible enough to respond to the information needs related to alternatives presented by different interests and alternatives arising from negotiation is needed. Issues likely to be raised by competing interests should be anticipated. Evaluation results must include as much information as possible to clarify these issues.