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# Introduction

**THE EFFECTS OF** urban and intercity transportation systems on the use of urban land have long been discussed and debated. Unfortunately, the relationship between transportation and metropolitan development remains very poorly understood. It is clear that urban transportation helps shape the spatial distribution of employment and residences. Further, transportation affects neighborhood patterns, land values, income distribution, and a host of other determinants of the overall quality of urban living.

As public awareness of the validity and importance of these effects has grown, transportation planners have been forced into a thicket of interrelationships. Fortunately, perhaps, as the realization increased that transportation facilities could be adequately analyzed only as a system, and that this system had important effects on the areas it served, the technological capacity to analyze and simulate important characteristics of complex systems also grew, primarily with the development of electronic computers. Consequently, over the last twenty years there has occurred an enormous expansion of activity devoted to the analysis of the interrelationship of urban transportation systems and the spatial dimension of many urban activities.

As a result of this effort, tremendous advances have occurred not only in the sophistication of the techniques employed to analyze the impact of transportation systems but also in the choice of effects to analyze. When first begun, transportation system studies were in fact highway system studies: research was limited to the effects of the highway system on the way people lived while motoring from point A to point B. Today, as the six models discussed in this survey make clear, the breadth of analysis attempted in contemporary transportation studies is enormously greater and more sophisticated. In fact, these studies can no longer be truthfully called transportation studies—they are land-use-transportation studies.

The rate of evolution of the models has not slowed, as the diversity of the recent models surveyed makes clear. The range of techniques used in these studies is very broad indeed; the range of ambitions is equally broad. One study, for instance, reports the intention to develop an apparatus that, when programmed to accomplish a final land-use configuration, will produce a consistent and efficient set of public policies which can attain the desired land-use pattern. Others set for themselves the somewhat more modest goal of projecting land-use patterns some number of years into the future, and planning a transportation system consistent with the land-use pattern. Only the latter structure is operational to date. But we believe that the trend in land-use-transportation studies is in the direction of the former.

We believe that in our survey of these models we have made two valuable contributions to this field. First, we present reasonably complete and accurate summaries of several current efforts in the field of land-use modeling. These summaries provide the interested layman with an introduction to activities in this field, and the land-use modeler with a survey of what has been done or attempted elsewhere. We believe that documentation of land-use-transportation studies has been unsatisfactory, in fact, that progress in this field has been impeded by lack of accessible information on what is being attempted elsewhere, and on which attempts have failed and which have succeeded.

The second contribution is in the form of what we hope is productive criticism of these models, as well as suggestions for possible improvements in current modeling techniques.

Finally, the authors believe that simulations of the relationships between land use and transportation systems, however much they are improved, will never produce transportation-system planning free of public disagreement and debate. As we have pointed out, transportation systems profoundly affect individuals and groups. In addition, by no means are the benefits and the costs of investments distributed jointly. Often their separate distributions are perverse, with an inverse relationship between benefits received and costs borne by individuals affected by changes in these systems. We do believe, though, that improved land-use models can be a very productive source of information in the debates that inevitably arise around transportation-system planning. It is our hope that, by clarifying the effects of public investment on the spatial configuration of urban areas, reliable land-use models will allow policy makers to employ these investments more effectively as policy tools.

An overview of the institutions and methodology of current transportation-land-use planning is presented in Chapter 1. Chapters 2 through 8 contain a more detailed study of land-use models developed for five major metropolitan areas. A critique of the current state of land-use modeling and some observations about organizing research and model building for transportation planning are presented in Chapter 9.