We feel that a regression approach to a retail location model is inappropriate unless the commerical activity is stratified. Our retail model is an equilibrium model which has shown an bility to develop new commerical clusters. It is run after the residential location model and is dependent only upon the distribution of demand and the accessibility matrix. The model is run interatively until a balance is achieved between demand and opportunities. Output of the model has reproduced the puckered tent of retail concentrations which we observe in the real world.

We also have three basic space consumption models. The residential space model says that residential density depends upon the extent of the region, income, space preference of income groups, and transportation costs. The commerical and industrial space consumption models are dependent upon the residential density in surrounding areas, simulating land market competition which is observed to result in the crowding of commerical activity by the demands for residential space. Space for roads and some other public services are determined by a third model.

The use of regression in many cases is a step backwards from the original model designs developed by P-J. Most models do not treat densities endogenously to the model system. Our treatment of density is not satisfying in many respects. No one has yet been able to explain the mechanism behind the withholding of large amounts of fringe land for long periods of time which results in the spottiness of development, and this has a substantial impact on densities. Another major factor in density patterns is the multi-family dwelling, which can produce tremendous changes in residential densities.

I have doubt as to the value of overall optimizing models unless various user costs, including housing utilities (preferences) and transportation costs are included in the criterion function. When we do specify such a model, I fear that the size of the matrix gets out of hand, at least with presently available computers. We would still be optimizing within a single strategy - of which there can be many and we would have to test between alternative strategies as we are now testing between alternative transportation policies.

B. The UNYTS Opportunity - Accessibility Model

John R. Hamburg, Director of Bureau of Planning,
New York State Department of Public Works

The question of scale is of prime importance to both the theoretical and practical aspects of constructing locational models. Is the relevant unit of study the inhabitants of a specified set of geographical areas, homogenous (with respect to some phenomenon or class of phenomena) set of households within a geographical set, individual families, or simply individuals? Without a clear statement of the class of activity to be explained and rigorous tests to measure the relative explanation afforded by alternate factors and geographic levels, the chances for significant results are indeed slim. In the absence of such tests, the tendency is to disaggregate into smaller and smaller units in the hope of finding the elementary behavioral unit. This is not sound theoretically and is completely impractical from a data management point of view.

It is most desirable that we have some understanding beforehand of the probable outcome and run of the forecasting procedure. This is not always possible, because of the size and complexity of metropolitan systems. It is necessary, therefore, to build into the model itself the means for quickly evaluating the model output. We have placed primary importance on this aspect in the design of graphic and tabular outputs that permit almost instantaneous visual inspection and evaluation.

The land use forecasting procedure at UNYTS is based upon the opportunity distribution model. Each activity has a given probability of location. Locational density configuration is a primary input to the running of the model and is exogenously determined, although we would prefer to see the densities result from an equilibrium process with the significant factors being land costs, transportation costs, land availability and technological advance.

The distribution of activity proceeds outwards from one or more nodes with the ranking of opportunities computed from the minimum path trees for each node as inputs into the computer. The distribution of activity can be originated from as many as 10 nodal points. The UNYTS forecast currently uses four basic land uses, vacant, residential, nonresidential, and passive non or low trip generating (not available for development).

The number of opportunities in a zone are calculated as the product of vacant land and the development intensity assumed for that zone. Nonresidential activity is distributed first and then residential, taking into account the consumption of land from the nonresidential forecast. Five year increments are used. We have tried two year intervals but observed only minute changes from the five year interval development patterns. Initially we have used the minimum path traveltimes for computing the ranking of opportunities. It is, however, possible to construct this ranking on the basis of other factors, for example zonal accessibility measures. We plan to investigate the development patterns resultant from various ranking procedures.

We have developed at UNYTS a list of eleven factors which we believe should be considered in the development of any land use forecasting procedure. These are:

1. Model output should be directly usable in existing traffic assignment procedures.

2. Model should be incremental and recursive.

3. Model should accept alternative measures as indices of access.

4. Calculation of activity density should be endogenous to the model.

5. Model should be capable of being calibrated. It should be able to simulate past growth or at lease calibrate the model parameters using the present structure.

6. Model should be based on same theoretical statement of the mechanism of land development.

7. Model should be relatively simple.

8. Model should be able to accept data from redevelopment, urban renewal, or new-town plans.

9. Model should have a capability of permitting easy abstractions. It should be designed to facilitate research.

10. Should have graphic and tabular outputs as well as magnetic tape outputs for subsequent assignments and evaluation work.

11. Sensitivity analysis should be included in the design of the model.

V. Development Policies - Twin Cities Area Joint Program

C. David Loeks, Director
Twin Cities Metropolitan Planning Commission

The Minnesota Highway Department, the Twin Cities Metropolitan Planning Commission, the Cities of St. Paul and Minneapolis and the seven counties comprising the Metropolitan area are jointly involved in producing a comprehensive plan for the Metropolitan Area. This program, which like the earlier work undertaken by the Minnesota Highway Departments, Twins, Cities, Areas, Transportation Study, focuses on the inter-relationships between transportation and land use. The TCATS Program forecasted vehicle travel needs for 1980, based on the general assumption that current land development policies and travel trends would continue through the forecast period.

The Joint Program supplants and extends TCATS in three basic ways. One, the use of a year 2000 forecast horizon. Two, the extension of the quality of comprehensiveness, that is, the contemplation of as many aspects of urban development as possible. Three, its focus on policy. Specifically, its analysis of the predicted effects of alternative land development and transportation policies.

Ideas About Alternatives

Why look at alternatives? The answer is to be found in the Joint Program's participants attitude about change, namely that is inevitable, predictable, and manageable. A mere effort to "intelligently predict and cooperate with the inevitable" is not considered to be adequate. In the Twin Cities, the extension of current development trends and policies point to certain conflicts and problems which seem to necessitate the introduction of different policies at some point in the future.

For example, the trend of continuing centrality in the downtown area on the one hand accompanied by the trend of substantial new growth at low density in the outlying areas produces travel demands which will necessitate by 1980 new facilities substantially in excess programmed resources.

Thus it is assumed that a plan based on the forecast continuation of past and current trends, to the measure that it is not able to accomodate these