RESEARCH YOU CAN USE

Traffic Generated by MXD: New Prediction Methods Ahead

Mixed use development is a signature feature of smart growth, new urbanism, and other contemporary land-use movements aimed at reducing the dominance of the private automobile in suburban America. By putting residences, offices, shops, restaurants, and other codependent activities close to each other, MXD shortens trips and thus allows what might otherwise be car trips to external destinations to become internal walking, cycling, or transit trips.

RiverPlace in Context

Stakeholders interested in the traffic impacts of MXD are quite a diverse group. Developers seeking to minimize the need for traffic mitigation measures are constantly debating ways to increase internal capture rates for trips between land uses. Local governments are always looking for ways to protect existing residents from the impact of increased traffic. Planners generally favor mixed use developments for a wide variety of reasons. Then there are the traffic engineers, who are skeptical about the traffic benefits of MXDs.

Communities face a dilemma: Should they err on the liberal side and approve an MXD—and risk unmitigated traffic impacts? Or should they err on the conservative side and discourage potentially worthwhile projects? To make a wise decision, they need a reliable trip generation methodology—which is largely unavailable.

Current methods of traffic impact analysis rely on rates and adjustments set by the Institute of Transportation Engineers. But ITE's methodology is widely believed to understate the traffic benefits of MXDs, and a decision based on it could lead to higher impact fees, exactions, and negotiated payments than should be the case. Such a decision could well preclude the development of otherwise desirable projects.

A better way

To address this dilemma, a dream team of land-use and transportation researchers has developed a new methodology for predicting the traffic impacts of MXDs. The team includes Michael Greenwald, Ming Zhang, AICP, Robert Cervero, Jerry Walters, Mark Feldman, Larry Frank, and John Thomas. (Full disclosure: I had some involvement with the effort as well.) Their work will appear in the next issue of the *Journal of Urban Planning and Development*, a publication of the American Society of Civil Engineers that caters to traffic engineers.

These researchers have access to integrated travel and development databases for six diverse regions: Atlanta, Boston, Houston, Sacramento, Seattle, and Portland, Oregon. The databases provide the precise coordinates of each trip's point of origin and destination, along with parcel-level land-use data. That allows the researchers to analyze travel to, from, and within small MXDs. The study's total sample includes about 36,000 trip origins and destinations for a broad array of MXD types and settings across the U.S.

One of the 239 MXDs in the study is RiverPlace, a new urbanist neighborhood immediately adjacent to downtown Portland. The internal capture rate of this 32-acre development is a surprisingly high 36 percent. Of the external trips, 14 percent are made by walking and nine percent by transit. The development's external auto trips average 7.7 miles, somewhat shorter than the average for the Portland region. On balance, the traffic impact of RiverPlace is a fraction of that generated by single-use suburban developments of comparable size and composition.

The study is one of the first in planning to use hierarchical modeling methods, which are common in public health and education research. Hierarchical modeling is necessary because all of the trips to, from, and within a given MXD share the characteristics of the development and of the region in which it is located—that is, they are dependent on those characteristics. This interdependence violates the assumption of independence that underlies ordinary least squares ("OLS") regression analysis, the technique we learned in our basic statistics course.

The researchers found that the internalization of trips within MXDs is significantly related to the development's land area, employment, jobs-population balance, and density of its intersections. The two strongest influences on external walking trips are intersection density and a concentration of jobs within a mile of the MXD boundary. The most significant environmental influences on transit use are intersection density, the number of jobs reachable within 30 minutes by transit, and the presence of a transit stop within a quarter-mile. These results, which are consistent with the literature on this topic, suggest that MXDs that concentrate residents, workers, and retail shops in close proximity to one another can "de-generate" automobile trips.

The length of external trips by private vehicle is related to regional accessibility: How many jobs can be reached within 20 or 30 minutes by automobile? The length of vehicle trips is also related to the jobs-population balance. When the number of nearby jobs increases, the length of auto trips on average decreases.

To validate their models, the researchers compared their predictions with traffic counts taken in 22 MXDs in four states. At 15 of the sites, they found that the models came within 20 percent of the actual vehicle counts. At four sites, the models came within 30 percent, and at one within 40 percent. Only two sites were off by more than 40 percent. When compared with the ITE method for estimating trip generation, the models improved the prediction of vehicle counts at 16 of the 22 validation sites.

Based on the validation results, two of the coauthors—Walters and Thomas—are

strongly promoting the new methodology. It has been applied to MXDs in San Diego, Seattle, Virginia, and elsewhere. And now Ryan Hales, a traffic engineer in Salt Lake City, has convinced the Utah Transit Authority to use the new methodology in planning for transit-oriented developments. Maybe someday traffic engineers will be as enthusiastic about mixed use development as planners already are.

Reid Ewing

Ewing is a professor of city and metropolitan planning at the University of Utah and an associate editor of the *Journal of the American Planning Association*. Past columns are available at http://cmpweb.arch.utah.edu/research_projects/research-you-can-use.