

# ASSESSING HIERARCHY OF NEEDS IN LEVEL OF SERVICE

## PROBLEM STATEMENT

Level of Service (LOS) is a measure that describes the operational conditions within a traffic stream, generally in terms of travel time, speed, freedom to maneuver, traffic interruptions, comfort, and convenience (HCM, 2000). It is hard to understand LOS across several modes because each mode assesses LOS differently. Current LOS measurement methods make the roadway facility performance and multimodal tradeoff decisions difficult to determine. Many assessment approaches were considered in previous research (Winters et al., 2001). Florida transportation professionals identified the lack of a common denominator among the current measures as one of the most significant obstacles. They also noted that only the bicycle and pedestrian levels of service are based on system characteristics that have been correlated to user responses. It has been suggested that there is a hierarchy of needs that affects mode choices. If so, any method developed to assess LOS across modes must take it into account.

## OBJECTIVES

Abraham Maslow's theoretical hierarchy of needs states that once people meet their most basic, lower-level needs, they begin to consider higher level needs. The primary focus of this research project was to determine if there is empirical evidence for a Hierarchy of Transportation Needs. The experimental procedure, methodology, and materials for this project were designed using both transportation stated preferences studies as well as the work of Alderfer and his Existence, Relatedness, and Growth (ERG) Theory (1972, 1985).

## FINDINGS AND CONCLUSIONS

The results of this study provide empirical evidence for the existence of a Hierarchy of Transportation Needs. Survey results support the existence of a hierarchy: participants chose *Existence* needs over *Relatedness* needs, *Existence* needs over *Growth* needs, and *Relatedness* needs over *Growth* needs. *Existence* needs are defined by attributes of survival (e.g., eating and sleeping) and safety needs. *Relatedness* needs are defined as self-esteem needs, the need for fulfilling and enriching relationships, and the safety of the self-esteem in those relationships and in encounters with others. *Growth* needs are defined by higher level attributes such as the altruistic desire to help the environment by riding a bike and reducing vehicle emissions. *Growth* also represents the desire to realize one's highest potential and to seek things like truth, knowledge, and justice.

This study demonstrated that a lower motivator need not be substantially satisfied before higher motivators are pursued. The results also showed that more than one need may be motivational for choosing a particular mode, which suggests that approaches to LOS measurement and community response need to be reconsidered. This project demonstrated the importance of understanding which factors motivate behavior, beyond the traditional LOS measures of time and cost. Current LOS methods may provide incomplete or inaccurate assessments of policy actions aimed at motivating travelers to use transit, bicycle, and pedestrian options. Thus, there may be a need to perform sensitivity analysis when modeling mode choice to reflect a range of responses expected from improvements to LOS variables.

To motivate changes in travel behavior (i.e., increase the LOS), transportation professionals must recognize that a traveler has multiple needs to satisfy simultaneously. An individual's mode choice for a trip is presumably based on the LOS variables. How individuals respond to these variables depends on both the observed and the unobserved characteristics of a particular option for meeting their needs. For example, if authorities consistently enforced speed limits, bicyclists' and pedestrians' perception of safety would increase without the need for extensive capital improvements. Focusing on only one type of need (e.g., existence) to the neglect of others could limit the effectiveness of improvements and flaw LOS tracking efforts. Transportation planners should supplement the variables currently used for determining LOS by incorporating factors that reflect the existence, relatedness, and growth needs for motivating mode choice decisions

## **BENEFITS**

This research has produced (1) empirical evidence that there is a hierarchy of needs that determines mode choice, i.e., the ERG theory applies to the process of determining transportation needs, and (2) an approach to modeling decision-making in various transportation scenarios. The results indicate that people will make certain mode and transportation choices based upon a psychological need hierarchy. Confirmation that the ERG hierarchy of needs applies to transportation mode choice suggests that future efforts will be able to convert that hierarchy to a multi-modal LOS ranking.

The implications of this work are broader than progress toward a multi-modal LOS tracking system. The results suggest that transportation professionals must act upon the fact that a traveler has multiple needs to satisfy simultaneously to motivate changes in travel behavior (i.e., increase the LOS). There are "out of the box" options for improving LOS in addition to the traditional improvements considered by policymakers and professional staff. For example, persons who think a mode choice would be accepted and approved by others important to them would be more likely to intentionally choose that mode. Thus, social marketing campaigns could improve a user's perspective of LOS without extensive capital improvements. Ignoring the roles *relatedness* and *growth* needs play in mode choice decision-making may result in improvements that are less effective in improving the perceived LOS among travelers.

The developed approach should help to clarify the process for making trade-offs among modes at the local level and optimize the provision of an efficient and balanced transportation system that communities envision. Increased use of non-highway modes can benefit communities by reducing traffic delays, decreasing energy consumption, and reducing emissions from mobile sources.

In summary, developing a multi-modal LOS tracking system would provide a variety of benefits, including the following:

- more understandable LOS ratings that better reflect the needs and motivations of users
- consistency in and compatibility across ratings
- increase in environmental sensitivity and balance
- a tool for engineers and planners to develop transportation systems and services that are more responsive to the needs of travelers
- guidance to developers for designing more livable communities.

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