



**OTREC**  
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## AN OPERATOR SURVEY MAKING BUS TRAVEL SAFER

*TriMet and OTREC team up to explore some of the causes and solutions relating to safety risks in bus transit.*

### The Issue

Generally, public transit is safer than other personal travel modes. However, not all transit modes are created equal: compared with other forms of transit, buses have a higher safety incident rate. For example, while buses in fixed route service accounted for 39% of the transit industry's passenger miles in 2009, their associated casualty and liability costs accounted for 51% of the industry total. In 2010 TriMet, the Portland, Ore. region's transit provider, formed a safety task force to review its bus operations.

The task force recommended that TriMet develop a comprehensive performance monitoring program to better integrate safety in its planning practices. Like other urban transit providers, TriMet was already sending safety performance information to the Federal Transit Administration's National Transit Database. The task force recommended seeking a deeper understanding of the types of incidents that are occurring, and of when, where, and why they occur. The task force also recommended that operators complete a recertification program annually to ensure that safe driving practices remain fresh.

In addition to keeping operators current on their safety training, the annual recertification program presented researchers with a unique opportunity to gain a firsthand perspective of the safety risks that bus operators encounter on a daily basis. Thus a survey of operator perceptions of safety risks was added to the training exercise. Investigators James G. Strathman and Sung-Moon Kwon, of Portland State University, explored those survey results.

### The Research

For the purposes of the operator survey, the sources of safety risk in bus operations were organized into five general categories: 1) vehicle design and maintenance; 2) route design and location/design of stops; 3) operating conditions; 4) operator fatigue; and 5) operator stress. The survey was designed to address all five of these categories. Risk factors were identified in each of the five categories, and operators were asked to rank the factors in

### THE ISSUE

In order to improve the safety of bus transit, TriMet and OTREC conducted a bus operator survey during the drivers' annual safety training. Survey results were analyzed to determine ways to improve TriMet's safety ratings.

### THE RESEARCH

To gain information about the safety risk factors that bus operators face on a daily basis, researchers asked them for information about:

- How risk factors in five general categories affected their daily operations;
- Their views on safety enforcement activities and roadway user negligence;
- Their work shifts (whether they were full or part time) and level of experience.

### THE IMPLICATIONS

A breakdown of responses shows that operators' safety risk perceptions are somewhat sensitive to their employment status and work circumstances. With this in mind, the survey indicated that fatigue and stress are important sources of safety risks for all bus operators.

*Photo: A TriMet bus pulls up to a stop in downtown Portland, Ore.*

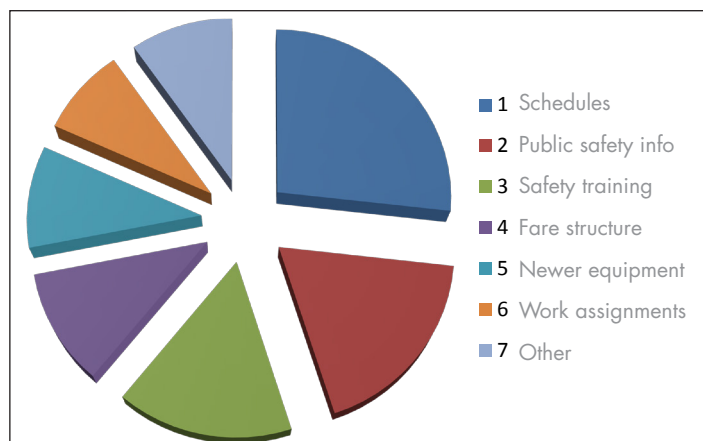
order of importance. After ranking specific safety risk factors in each of the five categories, they were asked to rank order the categories themselves on the basis of perceived safety risk.

Beyond this, the survey also collected operators' views on safety enforcement activity. The drivers taking the survey were asked to rank the importance of four different types of roadway user negligence: distracted motorists, distracted cyclists and pedestrians, drug/alcohol impaired road users, and road users ignoring the "yield to bus" signs on the back of the bus.

The survey also sought information about the frequency and nature of "close calls" involving the bus or its passengers, and asked operators for suggestions to improve safety in TriMet's established standard operating procedures. The final part of the survey collected information on whether the operators were full-time or part-time, as well as how long they had worked at TriMet. These differences in employment status were important, as they can affect operators' work assignments. For example, part-time operators are much more likely to draw split-shift assignments, and their shifts are more likely to fall during peak travel times. Consequently, part-time and junior operators generally face greater safety risk exposure related to traffic conditions, schedule maintenance pressures, and driver fatigue.

## Implications

Researchers drew some significant conclusions from the survey. They found that fatigue and stress are important sources of the safety risks that operators perceive in their work environment. The pressure of maintaining a schedule was the most important stress-related concern



### Recommended changes to standard operating procedures

Based on the responses to the operator survey, the most common change that drivers recommended was an adjustment to TriMet's schedules, which the responding operators stated left too little time for recovery and layover.

## PROJECT INFORMATION

TITLE: Bus Safety Performance Monitoring and Analysis

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of part-time operators, whose work is concentrated in congested peak periods, and was the second greatest concern among full-time operators. Schedules were also the focus of the most frequently recommended change in standard operating procedures, as shown in the pie chart to the left.

For selected safety risk factors there were significant differences in perceived risk between part time and full time, and between less experienced and more experienced operators. For example, full time operators perceived fatigue to be the greatest safety risk, while part time operators perceived stress to be the greatest safety risk.