

Performance Assessment of an Onboard Monitoring System for CMV Drivers: A Field Operational Test

BACKGROUND

The primary goal of an onboard monitoring system (OBMS) is to enhance driver performance and safety. OBMSs are employed with the expectation that feedback provided concurrently (via flashing feedback lights in the vehicle) and cumulatively (via coaching by safety managers) will have a positive impact on driver performance.

The Federal Motor Carrier Safety Administration initiated an OBMS field operational test (FOT) to determine whether onboard monitoring could reduce at-risk behavior among commercial motor vehicle (CMV) drivers and improve driver safety performance. More specifically, the aim of the FOT was to determine if recording and reporting of safety-critical events (SCEs), followed by driver coaching, could enhance safe driving behavior. Researchers also evaluated drivers' and safety managers' attitudes toward the OBMS over time. Table 1 provides the research questions addressed in the study, along with a summary of key findings.

STUDY APPROACH

Data for each vehicle and driver were collected over 12 months using OBMSs that were instrumented at the beginning of the study. This 12-month period included three phases: a 1-month baseline, a 9-month intervention, and a 2-month withdrawal phase.

Four operational fleets (two trucking fleets and two motorcoach fleets) participated in the study, including 156 OBMS-instrumented vehicles and 317 commercial drivers. These four fleets are labeled Fleets A, D, E, and H. Fleets A and H were trucking firms and Fleets D and E were motorcoach companies. In the trucking fleets, drivers were placed into two study groups—feedback and control. There was no control group in the motorcoach fleets.

SCEs were recorded for all phases, but feedback from the system was provided only during the intervention phase and only for the feedback group. Drivers in the control group did not receive any OBMS feedback.

Research Question	Statistical Significance/Key Findings
1. Does individual driving performance improve over time (e.g., braking, distraction) with OBMS feedback?	The event rate did decrease over time in general, but findings were not statistically significant.
2. Does the OBMS (with the feedback program) improve safety (e.g., decrease the number of SCEs)?	Yes; statistically significant findings for all four fleets.
3. If driving performance improves, does the improvement persist?	Yes; statistically significant findings for Fleet A.
4. How do drivers' attitudes toward the OBMS and feedback program change over time?	Drivers' opinions of the system seemed to become slightly more negative over time.
5. What are the fleet safety supervisors' attitudes toward the OBMS?	Fleet safety supervisors tended to have positive attitudes toward the OBMS.
6. Does the OBMS (with feedback program) reduce crash rates?	Mixed results; mean crash rates per vehicle per 10,000 miles of driving in Fleet A increased from the baseline to the intervention phase (not statistically significant), while the mean crash rates in Fleet H decreased (statistically significant).

Table 1. Research questions and key findings.



FINDINGS

The number of critical events and critical event rates were compared across different study phases (baseline, intervention, and withdrawal) and different study groups (feedback and control). Drivers' and safety managers' perceptions of the OBMS (with feedback program) were assessed via questionnaires distributed periodically throughout the study period. A summary of findings for the six research questions examined over the course of this study is presented below.

1. Does individual driving performance improve over time with OBMS feedback?

There were no significant differences in terms of mean event rate per driver between the control and feedback groups in Fleet A, and the event rate of control group drivers in Fleet H was even lower than that of feedback group drivers. However, there were differences noted between the intervention period and the baseline and withdrawal periods in most cases for all four fleets. In general, the event rate did decrease over time.

2. Does the OBMS (with feedback program) improve safety?

The OBMS does improve safety for most fleets. More specifically, for Fleets A and E, the high- and lowseverity event rates dropped significantly in the intervention phase when compared to the baseline phase. There was also a significantly lower number of high-severity events in the intervention phase when compared to the baseline phase for Fleets D and H.

3. If driving performance improves, does the improvement persist?

The improvement did persist for Fleet A. With respect to the low-severity event rates, the withdrawal phase showed much lower numbers than the intervention phase, and both the intervention and withdrawal phases were significantly lower than the baseline phase. For high-severity events, although the event rate in the withdrawal phase was higher than that in the intervention phase, it was still significantly lower than the baseline phase. These outcomes demonstrate that improvement in Fleet A persisted even after the interventions were removed.

4. How do drivers' attitudes toward the OBMS and feedback program change over time?

Drivers' attitudes toward the OBMS were mixed. In the pre-study questionnaire, all drivers reported that their feelings were "neutral" or that they "slight agreed" that there were benefits to using an OBMS. Drivers' opinions about the system tended to become slightly more negative once the intervention phase began. Despite that, they still felt there were benefits to the system. Cluster analysis revealed four groups of drivers: those who were fairly satisfied with the system throughout the study, those who were not, those who had lower expectations initially, and those who had greater expectations initially.

5. What are the fleet safety supervisors' attitudes toward the OBMS?

Fleet safety supervisors had more positive opinions about the OBMS than the drivers. Their attitudes were fairly consistent from the start to the end of the study. They tended to agree that there were benefits to using the OBMS, and they typically disagreed or slightly disagreed that the system, along with the feedback and coaching, was distracting or annoying.

6. Does the OBMS (with feedback program) reduce crash rates?

Though not statistically significant, mean crash rates per vehicle per 10,000 miles of driving in Fleet A increased from the baseline to the intervention phase, while the mean crash rates in Fleet H decreased, which was statistically significant. The inconsistent findings between the two fleets may be due to differences in each fleet, as well as the small sample size of crashes (as crashes are very rare).

CONCLUSIONS

Results suggest that the OBMS did improve driver performance and safety for the four fleets in most cases. With respect to crash reduction, the OBMS immediate feedback and coaching had a significant impact for one fleet (Fleet H). A longer evaluation period is recommended for future studies, as it may reveal more clearly the benefits of the OBMS with respect to crash mitigation.

To read the complete report, visit: http://ntl.bts.gov/lib/60000/60500/60504/15-019-OBMS_FOT_FINAL-508C.pdf.