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IMPLEMENTING SLSI-PROVIDED OPPORTUNITIES SUPPORTS SAFETY CULTURE GROWTH

SUMMARY
The Short Line Safety Institute (SLSI) measures short line and regional railroads' safety culture using a multi-method assessment process that examines safety culture performance across the U.S. Department of Transportation (DOT) Safety Council's 10 Core Elements of a Strong Safety Culture (Morrow & Coplen, 2017). This document summarizes findings from an analysis of safety culture growth across 10 short line railroads that completed both an initial (Time 1) and follow-up (Time 2) Safety Culture Assessment (SCA) by SLSI.

In this analysis, the Volpe National Transportation Systems Center (Volpe) staff established Time 1 and Time 2 safety culture scores for each railroad, leveraging outputs from SLSI's SCA process. Volpe staff then measured railroads' safety culture growth within the 10 Core Elements. While the analysis revealed safety culture growth across all railroads and within all 10 Core Elements, the magnitude of improvement varied by railroad and Core Element.

BACKGROUND

Numerous factors can affect a railroad's safety outcomes. A strong safety culture can help reduce the frequency and severity of accidents by creating a safer, more accountable work environment. The DOT Safety Council defines safety culture as "the shared values, actions, and behaviors that demonstrate a commitment to safety over competing goals and demands" (Morrow & Coplen, 2017).

In 2014, with support from the Federal Railroad Administration's (FRA) Office of Research, Development and Technology, the American Short Line and Regional Railroad Association established SLSI, an organization focused on strengthening safety culture in the short line and regional rail industry. SLSI uses the 10 Core Elements of a Strong Safety Culture as a theoretical framework to operationalize its definition of safety culture. Figure 1 shows the 10 Core Elements, as adapted by SLSI.

#	Core Element Description
1	Leadership Is Clearly Committed to Safety
2	The Railroad Practices Continuous Learning
3	Decisions Demonstrate That Safety Is Prioritized Over Competing Demands
4	Reporting Systems and Accountability Are Clearly Defined
5	There Is a Safety Conscious Work Environment
6	Employees Feel Personally Responsible for Safety
7	There Is Open and Effective Communication Across the Railroad
8	Mutual Trust Is Fostered Between Employees and the Railroad
9	The Railroad Is Fair and Consistent in Responding to Safety Concerns
10	Training and Resources Are Available to Support Safety

Figure 1. The 10 Core Elements of a Strong Safety Culture

SLSI conducts voluntary, non-punitive, confidential SCAs for short line and regional railroads across the United States. SCAs provide a diagnostic appraisal of a railroad's safety culture at a given point in time, with documented Opportunities for Improvement.

SLSI began industry-wide implementation of its SCA model in 2016. The SCA model utilizes teams of Assessors and a multi-method, data-

focused, site-customized process that involves observations, interviews, document inventories, and surveys (surveys are only used at railroads with at least 25 employees). At the end of each SCA, SLSI provides the participating railroad with a final report that summarizes findings about the railroad's safety culture and suggests Opportunities for Improvement that may strengthen the railroad's safety culture, if implemented.

In 2019, SLSI developed its Time 2 Assessment process, to measure changes in a participating railroad's safety culture over time. To date, SLSI has conducted 12 Time 2 Assessments.

OBJECTIVES

The objective of the current analysis was to measure safety culture changes among 10 railroads that completed Time 1 and Time 2 Assessments with SLSI between 2016 and 2021. This research provides updates to a previous FRA report that summarized safety culture growth across four participating railroads (Kidda & Howarth, 2021).

METHODS

First, the Volpe team systematically compared each railroad's Time 1 SCA report with its Time 2 SCA report, with a focus on identifying positive and negative safety culture indicators under each of the 10 Core Elements of a Strong Safety Culture. Using these indicators, analysts estimated whether the safety culture under a particular Core Element strengthened, stayed about the same, or weakened. To support the interpretation of the SCA reports, analysts documented assumptions and reviewed areas of uncertainty with SLSI.

Next, the Volpe team implemented a scoring system to support quantitative analysis of the railroads' safety culture growth. For each finding in a railroad's Time 1 report, the Volpe team assigned a Time 1 score of 1, 2, or 3 (where 1 = poor performance, 2 = moderate performance, and 3 = positive performance), based on the language in the finding and the presence of an associated Opportunity for Improvement. Similarly, for each finding in a railroad's Time 2 report, the Volpe team assigned a Time 2 score of 1, 2, 3, or 4 (where 1 = poor performance, 2 = moderate performance, 3 = positive performance, and 4 = extremely positive performance/improved over Time 1). When assigning Time 2 scores, the Volpe team considered corresponding Time 1 scores and the direction of safety culture change (if any). This scoring system enabled the team to investigate how much each railroad's safety culture changed, by Core Element.

RESULTS

Each railroad in the study demonstrated evidence of safety culture growth in at least five Core Elements, as shown in Figure 2.

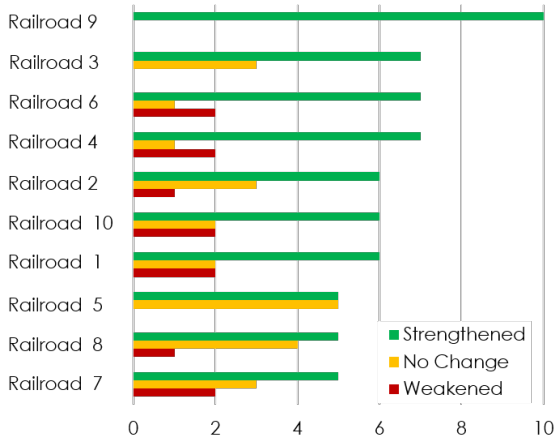

Figure 2. Number of Core Elements Strengthened, Unchanged, or Weakened over Time, by Railroad

The quantitative analysis provided additional insight into the amount of growth experienced by each railroad over time. As shown in Figure 3, all 10 railroads improved their overall scores by Time 2. The analysis revealed average safety culture growth within each of the 10 Core Elements, ranging from a high of 21 percent growth in Core Element 6 (*Employees Feel Personally Responsible for Safety*) to a low of 2 percent growth in Core Element 5 (*There Is a Safety Conscious Work Environment*) (see Figure 4). While the analysis showed positive growth in Core Elements 8, 4, and 5, the

percentages were too weak to suggest a positive trend across the participating railroads.

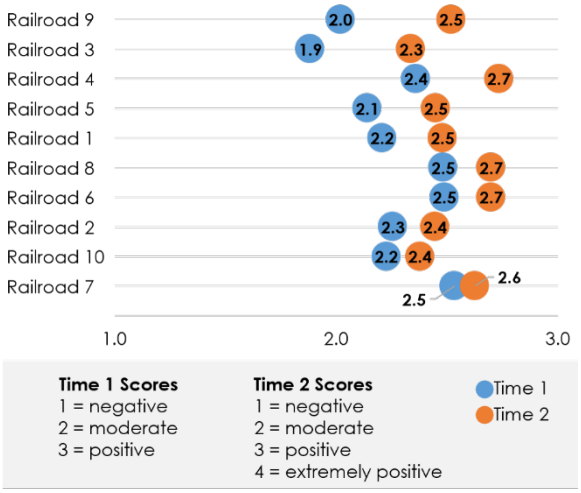

Figure 3. Changes in Participating Railroads' Safety Culture Scores Over Time

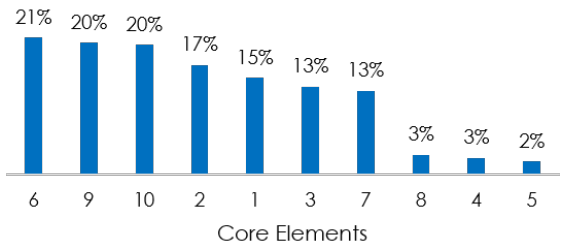

Figure 4. Average Growth in Safety Culture Elements Over Time

A factor that influenced the Time 2 safety culture scores for participating railroads was whether the railroad implemented the Opportunities for Improvement from the Time 1 SCA report. The Opportunities for Improvement that SLSI provides vary in complexity. For example, SLSI may suggest that a railroad post its safety mission in highly visible locations throughout the property. This would be inexpensive and easy to implement. Conversely, SLSI may suggest that a railroad implement a formal incident reporting and tracking system. This would require more time and resources to implement.

The Volpe team analyzed the implementation status of the Opportunities for Improvement identified in the participating railroads' Time 1 SCA reports. Figure 5 shows the percentage of Time 1 Opportunities that each railroad fully implemented, partially implemented, or showed no evidence of implementing, organized from highest to lowest percentage of fully implemented Opportunities. As shown in Figure 5, most of the participating railroads, 8 out of 10 fully implemented more than half of the Time 1 Opportunities provided by SLSI.

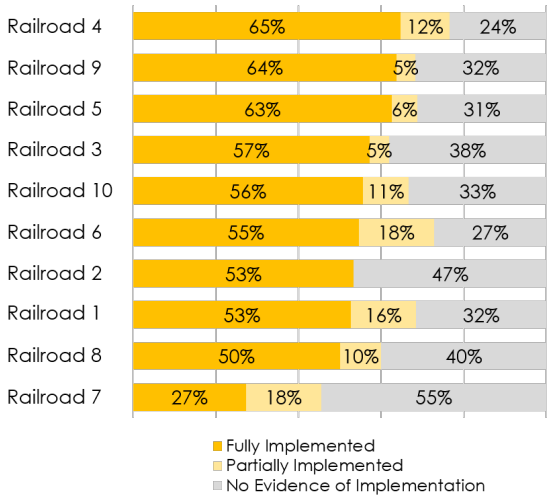

Figure 5. Status of Time 1 Opportunities for Improvement, by Railroad

As part of the Opportunities analysis, the Volpe team considered how much time had passed between the railroads' Time 1 and Time 2 SCAs. The analysis revealed a positive, moderate correlation (.68) between months lapsed and Opportunities fully implemented (see Figure 6).

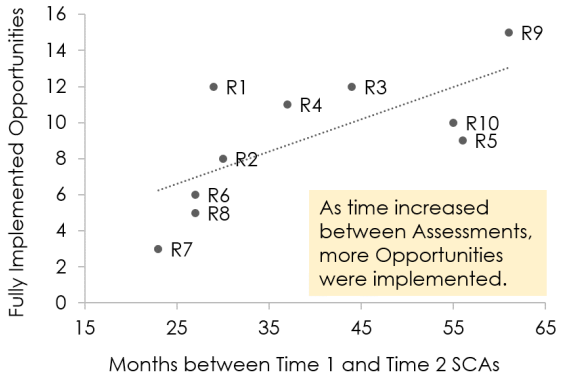

Figure 6. Relationship Between Opportunities Fully Implemented and Time

Of note, Railroad 9, which had the greatest amount of time between Assessments, showed the most growth, whereas Railroad 7, which had the least amount of time between Assessments, showed the least growth (see Figure 3).

CONCLUSIONS

While outcomes varied by railroad, the current analysis supports the hypothesis that implementation of SLSI-provided Opportunities for Improvement results in stronger safety culture outcomes. Most of the participating railroads (8 out of 10) implemented most of Time 1 Opportunities for Improvement provided by SLSI, which supported a stronger safety culture by the Time 2 Assessment. For all railroads, however, the Assessors reported that there was room for additional safety culture improvement.

This analysis raises the possibility that it may be easier for railroads to strengthen their safety culture under some Core Elements and more difficult under others, as evidenced by the trends in safety culture growth for the 10 railroads (see Figure 4).

FUTURE ACTION

As SLSI continues to conduct additional Time 2 Assessments, the increased sample size will strengthen the analysis and increase understanding of the relationship between the SCA process and safety culture changes observed at the railroads. Future research could examine why participating railroads tend to make greater improvements in some Core Elements than in others. This knowledge could inform the development of tools and resources that may help railroads improve their safety culture within those more challenging Core Elements.

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KEYWORDS

Safety culture, safety culture model, safety culture assessment, safety culture measurement, evaluation, short line railroads, regional railroads

CONTRACT NUMBER

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