Leading Measures of Safety Performance

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Most safety professionals recognize that an important key to improving safety performance is through effective utilization of leading measures. Measurement is an integral part of good management practice. However, although we have measured safety performance for years, we have not traditionally done a good job of measuring specific safety activities and the safety process itself. There are various strategic reasons to measure leading indicators of safety performance. For example, measures may be used to hold people accountable for safety, as predictors of future safety performance, and as specific tools to help employees, at all levels, better understand and improve the safety process.

There are additional strategic reasons why organizations find it desirable to implement leading safety measures. When designed well, with employee input and participation, these measures can serve as an influence to increase employee motivation for safety. Well designed and executed leading measures may also serve as a catalyst to drive positive change in an organization.

Proactive vs. Reactive Mindset

Traditional approaches to measuring safety are highly reactive. The primary focus is on injuries and injury rates. Proactive approaches focus on analysis and improvement of the safety management system. Due largely to these traditionally reactive measures, management tends to focus on the lack of injuries. In a proactive approach management focuses on improving the overall management system. In accident investigation, the reactive mindset is demonstrated by the focus on symptoms, such as unsafe acts and unsafe conditions, rather than a focus on identifying and correcting the root causes.

A proactive mindset impacts all areas of the safety management system. The primary reason for training is based on improving the system, versus training based on a response to regulatory requirements. In a proactive mindset, recognition for safety is also based on a systematic effort to improve the management system. In a reactive mindset group recognition for safety is commonly

based on history, i.e. the number of incident-free days or work hours since the last injury. Recognition for individuals tends to be negative such as reprimands for unsafe behaviors.

Establishing Metrics to Drive Safety Performance

By strategically establishing leading safety measures an organization can influence the development of a more proactive mindset and culture. The metaphor of driving can be applied to the way we measure safety. If one practices defensive driving, and drives with a proactive mindset, they may use techniques such as these examples from the Smith System that encourage the driver to 1) Get the big picture, 2) Aim high in steering, and 3) Keep your eyes moving.

Similar to driving a car, there are parallels to establishing good safety measures. These example points from the Smith System all involve using one's eyes and thinking ahead. The one key involves keeping your eyes moving while driving. This involves an awareness of what is all around, front, sides, and back of the vehicle, and simultaneously maintaining a space cushion around the vehicle whenever possible. As a part of keeping the eyes moving, the driver may spend 90% of the time looking ahead and 10% of the time looking in the rearview mirror.

Traditional safety measures tend to be the opposite of this 90/10 practice. In other words, safety measures tend to spend 90% of the time looking in the rearview mirror (what is already in the past) and only 10% of the time looking ahead, as in proactive and leading indicators. While looking out of the vehicle, drivers may also scan the roads for traffic patterns and situations, then focus whenever there is potential for collision or emergency maneuver needed. Generally speaking the good defensive driver recognizes those variables that are most important to safe driving. The driving metaphor can provide us with some lessons for using leading measures to drive safety performance:

1. Appropriate Mix: Use a mix of looks (measures) such as looking ahead, to the side, and to the rear. Don't just look ahead or look back only. As in driving, the suggestion for effective application of safety measures is to put the major emphasis on looking ahead and using leading indicators. These leading indicators predict what will happen with the trailing or results measures. An 80/20 or 90/10 mix is probably a good mix for the percentage of leading measures versus the percentage of trailing or lagging measures.
2. Scan & Focus: Instead of focusing on injuries, scan injuries for trends and focus on eliminating risky exposures and systematically increasing safe behaviors.
3. What should we measure/ what drives safety? Determine the variables that most influence safety performance and measure those drivers of performance.

Regarding the third point, those variables that tend to have the greatest impact on driving performance are "soft measures" such as 1) management's visible commitment to safety, 2) engaging and empowering workers in key decision areas for safety, 3) regular evaluation and reduction of job hazards, and 4) relevant and effective training. These soft measures may be a little more difficult to measure than numbers of injuries and injury rates, but the soft measures almost certainly have a greater impact on performance. This is a point that may not be well recognized by many managers and safety professionals.

Measuring the Safety Climate

The term "Safety Culture" wasn't in the safety lexicon 25 years ago. The terminology was coined after the incident at Chernobyl in 1986. Since that time when tragic accidents occur the follow up investigations often point to a poor safety culture as being the primary reason behind the events leading to the incident. Safety culture was implicated as a prime contributor to both the NASA Challenger and Columbia explosions.

 Two investigations were undertaken following the BP tragedy in Texas City in 2005, and both implicated a deficient safety culture as primary contributor. Example statements from the BP Independent Panel Review chaired by Jim Baker include:

- "BP has not established a positive, trusting, and open environment"
- "Lack of operating discipline and toleration of serious deviations"
- "Likely under reporting of incidents"
- "The Panel is under no illusion that the deficiencies in process safety culture, management, or corporate oversight…are limited to BP."

The other review of the BP tragedy was conducted by the US chemical Safety Board and recognized there were negative impacts from reorganizations, downsizing, budget cuts, productivity pressures, and procedural deviations. Both of the investigations concluded that a dysfunctional safety culture existed at all levels of BP.

Consequently, due to all of these and other events, safety culture and safety climate have received a lot of attention in recent years in the safety research literature. Safety culture is measured through safety climate perception surveys. These surveys are a potentially valuable measurement tool. Generally speaking, a well-designed safety climate survey is:

1. Practical – it measures perceptions of all levels of the workforce regarding those factors considered most important to safety.
2. Prescriptive – it provides specific information about the strengths and weaknesses and what needs to be addressed.
3. Proactive – Identified problems can be corrected before they result in injuries or illnesses.

As an example, a safety survey instrument at Indiana University, the Seo Safety Climate Scale has been developed and used in various industries and 10 countries around the world. This scale measures five dimensions of safety, 1) Supervisor safety support, 2) Co-worker safety support, 3) Management commitment to safety, 4) Employee participation in safety-related decision making and activities, and 5) Employee safety competence level.

It is recommended that safety climate surveys be customized for the specific organization. Customization is superior to "canned" and "off-the-shelf" surveys. If the organization does use an existing survey, consider modifying it for relevance.

Ten Steps for Establishing Leading Measures

1. Prioritize
Evaluate trends from injuries, near misses, exposures and hazards to determine controls needed to prevent injuries. Use trailing indicators to highlight trends that warrant attention. Organizations are encouraged to consider those low probability risks where there isn't as much injury data available. For example, incidents in confined space entry situations may not be as frequent as foreign bodies in the eye, but the consequences of confined space incidents are much more severe. Those operations that could result in serious injuries and fatalities are also priorities for measurement. Many organizations identify and control their Critical Five, or the Big Four, that may include highly hazardous operations such as confined space entry, lockout of high energy, and fall protection from high levels.

2. Determine Level of Organization to Measure
There are typically different measures for top management versus measures for employees. Some general principles, recommended by Dan Petersen, include macro, results oriented measures for top management and micro, activity oriented measures for employees. Middle management and front-line supervisors measures are effective with a mix of more macro measures for middle management and more micro for supervisors. Engagement in safety through these measures is important at all levels, but perhaps the greatest need for engagement is at the employee level. Generally, more immediate feedback can be given to employees for micro, activity measures than for the macro results measures that may take time to accumulate for top management.

3. Verify Controls and Identify Obstacles
Simply measuring a safety initiative from a leading perspective does not guarantee that it will yield improvement in safety performance. When hazards are detected in the workplace, either engineering controls, administrative controls, personal protective equipment or a combination of the three must be applied to the hazard. However, as many safety professionals can attest, many hazard controls are ineffective in accomplishing their intended objective. As such, measuring a hazard control (i.e., training, PPE compliance, etc.) can be a fruitless exercise if the control for a particular hazard does not work. For this reason, companies are encouraged to ensure that measuring a safety effort or hazard control is a worthwhile venture. Investing time and resources to see how well a useless safety initiative is performing is an exercise in futility that can only harm the safety professional's credibility and tarnish upper management's perspective on using leading indicators.

Verifying efficacy of controls can be a challenging, and at times, unclear task. While there are many statistical process control tools that can be applied in various areas of safety performance measurement, it is in this verification phase where they become most useful. For example, the use of control charts can help determine if a reduction in injuries after a new safety initiative was implemented resulted in the reduction of injuries that was experienced or if the reduction was simply within the control limit of random variation (Brauer 573). The presentation of all the various statistical control methods is beyond the scope of this technical paper, so safety professionals are encouraged to research those tools that would best serve their efforts to verify that their hazard controls actually accomplishing their intended objectives.

4. Determine a Simple List of Measures
A common mistake is trying to measure too much all at once. Efforts to collect, analyze, and communicate the data from leading indicators can be labor intensive. Many organizations that have been successful with leading indicators have chosen three to five key measures to use. A measurement system that is too complicated to understand, too expensive to maintain, or overwhelming to administer will not serve the purpose intended. If too many measures are used, it will be impossible to focus, and employees won't be clear about which areas are most critical for safety success. Since the measurement system is dynamic, specific measures can be added, dropped or modified over time to make measures more applicable. The organization may decide to start simple and add over time as new measures are mastered.

5. Identify Means for Meaningful Employee Engagement
Many organizations use scorecards and balanced scorecard systems. Employees at all levels are "score carded." When employees are engaged in establishing the critical safety measures that feed into the success of the organization, they are more likely to be motivated to make the measures successful and take ownership for safety.

6. Develop Methods and Tools
Developing assessment methods and tools is a fairly involved step for which customization is imperative. In this phase of development companies are determining how data will be collected, how frequently it will be collected and reported, analysis protocol, weighting of measures, etc. As with step three, simplicity promotes success. Assessment methods and tools should be efficient and spread responsibility throughout the engaged individuals and units of the organization. Utilizing company technology (i.e. intranet reporting) may create extra work in the development phase, however the returns on this investment of time and energy are substantial after the measurement system is in place. Documentation and instruction on collection methods must be crystal clear, as improper use of assessment and collection methods will provide data that may not be reliable. Finally, it is often beneficial if safety measures are built from similar platforms and methods of other business performance measures. For example, if a company utilizes scorecards or dash boards to gauge production and quality performance, it may advisable for safety to utilize the same methodology (Niven).

7. Develop Delivery Strategies
Safety performance data must be properly communicated to all parties to positively impact safety performance. Safety professionals are highly encouraged to make presentation of safety performance data congruent with the methods the company uses to communicate other business performance data. Whatever method is utilized, it should be appropriate for the workforce that will be using the data. If literacy or educational barriers are prominent in the workforce, the level of complexity with communication methods should be adjusted to enable all parties to clearly understand the safety performance data. Finally, the frequency of reporting should be considered. Safety professionals should communicate performance data as frequently as feasibly possible.

8. Set Performance Goals
Connect leading safety measures with short term and long term performance goals. When reasonable and relevant goals are established, especially if employees are involved in development of the goals, there is a motivational aspect that doesn't exist without these goals. Measurement is essentially meaningless without goals. It's kind of similar to driving a car with no

place to go – the measures as drivers may be in place, but without goals where will we end up? More effective goals are both challenging AND realistic.

9. Monitor Safety Progress

Measurement is not complete without monitoring to ensure that injury reduction and performance of safety efforts has a positive correlation with data from the leading measures. There is a difference between correlation and causation, of course. What we want to determine is reduction of injuries can be attributed to performance of a safety effort, and that it is not merely a coincidental correlation.

10. Adjust and Modify for Continuous Improvement

Consider safety measures to be dynamic and ever evolving. As improvements are realized, adjust the measurement system to continue to drive further improvements.

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