Safety Perception Surveys

What to Ask, How to Analyze

By Michael O'Toole and David P. Nalbone

IN BRIEF

- **Employee safety perception surveys measure employee perceptions about key factors or domains of an organization's safety management system.**
- **Such surveys provide additional vital information that identifies areas which need attention and enables management to improve an organization's safety process.**

The fundamental management process is to allocate available resources to a productive end. In the case of safety and health, management must identify how to best allocate limited resources to ensure the fewest mishaps that result in injuries to employees, damage to equipment or harm to the environment.

Research suggests that the safety management system has the most significant impact on injury rates (Carder, 2003; O'Toole, 2002). Other research involving safety management systems suggests that the most critical factor influencing successful safety results is that of management's demonstrated support of safety (Erickson, 2008). Based on her earlier research, Erickson (1994) also suggests that interventions targeting only safety-related items are less than successful if addressed in isolation. In other words, problems or issues identified as safety related are really a symptom of a broader management system issue, such as leadership and/or visible support for safety and health issues.

Zohar (1980; 2005) used employee safety questionnaires to identify the relative importance of specific safety factors in several industrial settings in Israel. Bailey and Petersen (1989) used the Minnesota Safety Perception survey to identify factors that positively contribute to injury reduction in the railroad industry as well as in several other industries. Results of Bailey's (1997) follow-up study suggest that at facilities with low injury rates, employees' perceptions of critical safety factors were highly positive.

Perceptions, like attitudes, have been recognized as an important factor in safety. Research in this area suggests that when measured, perceptions can predict the likelihood of certain behaviors (Ivers, Senserrick, Boufous, et al., 2009). The importance of this factor is especially critical where employees have little or no direct supervision. In such settings, an employee makes important choices and decisions about safety rules, practices and procedures. If perceptions about safety are low, that employee may be more likely to take a shortcut or engage in some other at-risk behavior which can lead to an injury.

Other research suggests that employees' safety-related perceptions are predictive of organizations' safety results (Carder, 2003; O'Toole & Nalbone, 2007; Seo, 2005). Where employee perceptions of an organization's safety climate are low (negative), the incidence of injury tends to be higher than in those organizations where employee safety perceptions are high (positive).

Michael O'Toole, Ph.D., is an associate professor of safety science at Embry-Riddle Aeronautical University where he teaches courses in occupational safety and health. A professional member of ASSE's Central Florida Chapter, he is a former administrator of the Society's Academic and Mining practice specialties. O'Toole holds a Ph.D. in Public Health from the University of Illinois, Chicago, and an M.S. in Safety Engineering from Northern Illinois University, as well as an M.A. in Industrial Psychology and a B.S. in Behavioral Psychology, both from Western Michigan University.

David P. Nalbone, Ph.D., is an associate professor of social psychology at Purdue University, Calumet. He earned his undergraduate degree from the University at Buffalo, and holds a master's and Ph.D. in Social Psychology from Claremont Graduate University. His teaching interests include introductory and social psychology, research methods and statistics, and stereotyping and prejudice. His research interests include terror management theory applications to political and social issues, and assessment issues in education and organizations.

These results clearly are supported by Bailey (1997) and Bailey and Petersen (1989). Currently, most organizations use some form of a trailing indicator, such as injury incident rates, to measure the success or failure of safety processes and programs. Some consider use of a safety perception survey as a leading or predictive indicator of the success or failure of safety processes and programs (Carder, 2003). Others view such a survey as a tool to help an organization continuously improve SH&E efforts (O'Toole, 2002).

Determining What Type of Survey to Conduct

Once an organization decides to deliver an employee safety perception survey, it faces several decisions. The first is whether to use an off-the-shelf instrument or develop the survey locally. Each approach has inherent strengths and weaknesses.

Off-the-Shelf Surveys

Off-the-shelf surveys should have undergone a formal development process that should provide several important details.

Reliability

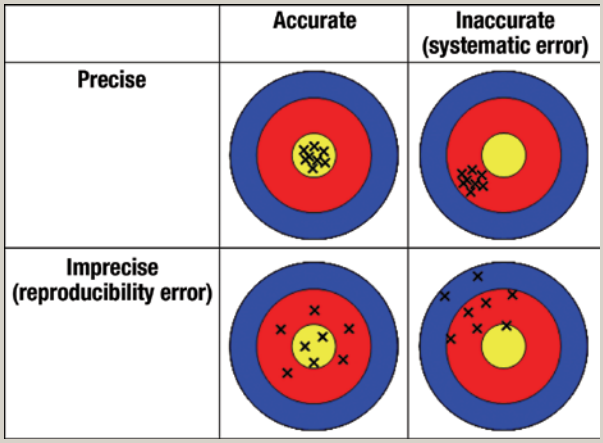
A properly developed and tested survey instrument provides users with a high degree of confidence in the information collected via the survey. Reliability, or the assurance of repeatable results (also known as precision) with the use of the same instrument in the future, is vital. Briefly, reliability refers to consistency of responses, in terms of both the people providing those responses and over time.

If a survey does not produce repeatable/stable results over time, its use becomes suspect. Ideally, the organization will use some or all of the survey results to improve the existing safety process. If the survey instrument is not reliable, valuable resources may be wasted on activities with less-than-desired outcomes.

Several factors affect the reliability of survey results, and numerous guides have been written on how to conduct surveys (e.g., Fowler, 1995). For example, unclear questions or questions for which there is not a wide range of responses (e.g., when there is a socially desirable, or "good" answer) hamper reliability. Thus, using a broad range of questions—as opposed to a more narrow range, or just a few questions—tends to improve reliability.

If reliability is lacking, validity also will likely be lacking. Therefore, producing reliable results is a necessary (but not sufficient) condition for establishing validity.

Figure 1
Accuracy vs. Precision



Conducting a pretest before full-scale implementation of the survey can help gauge whether the questions are clear and whether the intended meaning of the survey and its questions are being understood by those intended to take the survey. This useful step helps reduce the likelihood of discovering reliability problems later on.

Validity

If reliability is lacking, validity also will likely be lacking. Therefore, producing reliable results is a necessary (but not sufficient) condition for establishing validity.

To ensure that the survey instrument is valid, one must determine that it accurately measures what it is intended to measure. If the survey is not validated, then the results may not be useful and likely will result in resources being expended on gaps or weaknesses that may or may not be reflective of the actual state of the organization's safety processes.

Establishing reliability and validity of a survey instrument is time consuming and resource intensive. When using an off-the-shelf survey, users pay for the value of knowing that they are purchasing a valid, reliable instrument. However, this advantage must be weighed against the potential disadvantage of not being able to customize the survey to specific interests.

Changes

Often, a company may wish to change the wording of a question, or to add or eliminate questions. Such changes can be made, but usually at a cost. Additionally, depending on the nature of the changes, factors (those things the company is trying to measure) within the survey could be altered related to their validity and reliability; the changes also may introduce additional bias that adversely affects the power of the results.

In-House Surveys

A company also may choose to develop a home-grown employee perception survey. This decision presents several challenges. For example, the company must determine what constructs or factors the survey will measure. Although the survey is intended to measure employee perceptions of safety, this broad construct is better measured by identifying several more specific constructs, such as employee perception of management's commitment to the safety process; employee perceptions of their coworkers' commitment to the safety process; employee perceptions of the effectiveness of safety-related training; and employee perceptions of their involvement in the organization's safety processes.

Another issue is the timing and frequency of survey use. After administering the initial survey, having employees complete the survey at regular intervals (typically every 18 to 24 months) will provide management an additional metric against which to measure SH&E processes. This type of measure will typically give management a leading indicator to use with the traditional lagging indicators (Blair & O'Toole, 2010).

Question Development

Once constructs are identified, the organization must develop questions that measure those constructs in an appropriate way. The wording of questions must elicit a meaningful response without suggesting or guiding the participant to a "correct" answer, while still allowing for a range of responses to ensure enough variability among responses to be able to detect any significant effects. The organization also needs personnel with some statistical knowledge to ensure that the survey is measuring the intended constructs in a way likely to generate meaningful and useful results.

A common problem among first-time survey developers is that they develop a set of questions, but do not simultaneously keep in mind the analytical strategy that will be required to make use of the data, or of how the results of the analysis will assist key decision makers in determining what changes (if any) are needed to the safety programs or processes. Failure to keep such issues in mind can lead to wasted time and effort on an instrument with little redeeming value.

Advantages of a survey developed in-house are that it requires less upfront financial investment and the company can customize the level and tone of questions to match the target audience. As with an off-the-shelf survey, validity and reliability are key concerns which must be addressed by someone with a strong statistical background to ensure that the results provide meaningful information and do not waste resources.

Sample Questions

- Some of the safety and health procedures/instructions do not need to be followed to get the job done safely.
- Accident investigations are mainly used to identify who to blame.
- Management only bothers to look at safety and health after there has been an accident.
- There is nothing I can do to further improve safety and health here.
- Safety and health meetings are a waste of time.

Developing a high-quality survey is often an iterative process and may require a longer time horizon and incremental cost than most SH&E professionals and managers are willing to commit to this process.

Figure 2
Likert Scale Example

	Strongly agree	Disagree	Neither agree nor disagree	Agree	Strongly disagree
People who work here often take risks when they are at work					
I don't think my immediate supervisor does enough to ensure safety and health					

Likert-type scales, using anchors on the ends (e.g., strongly disagree to strongly agree) are often used; middle scores can be labeled (e.g., mildly agree) or not, provided there are 5 to 7 response choices and a number corresponding to each.

Sample Size

Regardless of the type of survey used, sample size is a consideration. In smaller facilities, having the entire workforce complete the perception survey may be appropriate; in larger facilities, a sampling procedure may be developed to ensure adequate representation of all important groups that are being surveyed. A large organization could elect to have all employees participate in the survey. A critical factor to survey success is to ensure that enough responses are collected to provide sufficient statistical power to detect any differences (either over time or as a result of an intervention).

Using the Results

Once the survey has been administered, the organization must decide how it will use the results to improve current safety processes and programs. One key to the use of such a perception is to not focus too hard on the degree of positive perceptions, or the gaps among or between various employee groups. Rather, management must focus on how employees developed the perceptions of concern.

Based on the authors' experience, management teams often become preoccupied with why all employees or a specific subgroup may have a particularly low perception of a given measured factor. They then set on a course to convince employees that their perceptions, at least of safety, are wrong.

Perceptions are similar to attitudes and are difficult to change when attacked head-on. Thus, the data analysis should direct efforts toward identifying how employees may have a less-than-positive perception of a given factor. After all, the perception may be accurate even if it is difficult for management to hear. From there, it may be possible to create a remedy to improve the perception of a low-scoring factor.

Another concern is a fear that the survey will reveal poor practices of supervisors or managers. Although issues of management style or approach may drive a particular set of perceptions, that knowledge may offer senior managers the opportunity to provide resources in the form of training, education and mentoring to alter or improve the behaviors or practices of concern.

As with most survey research, confidentiality is important and must be addressed. Since information requested also may imply either poor employee practices or behaviors which violate safety rules, care must be taken to ensure that participants' responses will not result in termination or other sanctions; otherwise, workers may provide inaccurate responses based on fear of possible repercussions.

Ensuring confidentiality often begins with a well-crafted memo or cover letter outlining the value of employees' input. Participants must understand that to improve safety procedures or processes, honest responses (as opposed to those that sound like the "right" answers) are needed. Strong assurances of confidentiality of all responses will go a long way to that end.

A key aspect of the use of perception surveys is to provide feedback to managers as well as employees. If employees do not receive a general summary of the results or information about how the results will be used, they may be less inclined to complete such a survey in the future, and also may be suspicious of its purpose.

Good feedback provides employees with a general, nontechnical explanation of the findings, a summary of any changes to be implemented as a result of the findings, and a chance to express any concerns or questions about the survey process or the results. Providing employees a chance to have their views heard (and reflected back to them) should help improve employee buy-in to the safety perception survey process.

Analysis & Evaluation

Determining what types of analyses to run is a key element of survey development and planning. To effectively use the information gleaned from the survey, it is wise to consider what processes or procedures might be informed by the survey results.

Typically, a handful of questions are written that address a given area; these are then averaged and used as a benchmark for that particular area, with future data compared to that benchmark. Using 5 to 10 benchmark scores should keep the survey process manageable, and allow supervisors from different areas to highlight the parts of the survey analysis that are particularly relevant to their areas.

A final element of the survey cycle is reevaluating the entire process once complete. What was learned and what remains unknown? What effect did changes made based on information gained from the initial survey have on measureable outcomes? What improvements can be made to the process to make it more effective or efficient?

Thoroughly documenting the results of the reevaluation can be useful, especially if significant time has elapsed between the end of one survey cycle and the start of the next. A perception survey

is a tool intended to drive continuous improvement and should not be considered a one-time fix.

Conclusion

The SH&E profession and government regulators recognize that several factors increase the success of an organization's safety process. One is management's visible support of the process (Bailey, 1997). Using a tool such as an employee safety perception survey and reacting to the results in a visible, positive manner sends a powerful message to the workforce. In addition, it has been suggested that the more employees are meaningfully engaged in the SH&E process, the more successful that process is, especially in relation to the number and severity of injuries (Carder, 2003).

Using an employee safety perception survey, the organization is tapping its best resource for hazard identification. When the organization addresses identified issues in a positive manner, it is attending to issues of immediate importance and relevance to those at risk. **PS**

Reliability & Validity of Safety Surveys

Any type of measurement, no matter its content or format, must be concerned with two psychometric issues: reliability and validity. Reliability refers to consistency of scores. If respondents answer the same (or similar) questions with different responses, their scores are unreliable. Using a more general example, if one steps on a bathroom scale, then off and back on, one should get the same weight reading (unless one has added or removed clothing); if not, the scale is unreliable.

However, while reliability is a necessary condition for demonstrating validity, which is concerned with whether one is measuring what one intends to measure, it is not enough. Using a typical bathroom scale, one can get reliable results, but only for weight. A bathroom scale cannot provide valid information about an individual's height, intelligence or any other characteristic.

When developing a survey, both reliability and validity must be considered before the survey is administered. To address validity, one could present survey questions to experts within a given area (e.g., safety inspectors, management) to see whether they agree that the questions address the desired constructs.

Reliability is generally only assessed after data collection, by internal consistency, to determine whether items on a given scale are all correlated with each other (as they should be, if they all tap into the same construct), or by test-retest or alternate-forms of reliability, to see whether different administrations or forms of a test produce similar responses (i.e., are correlated).

Generally speaking, all item responses must be on a continuous scale (i.e., multiple choice items will not work well), and should provide a reasonably large range of possible responses (5 to 7 seems to work well). Shorter response forms (e.g., "do you agree or disagree that . . . ?") do not provide enough middle ground, and longer forms seem to provide too much complexity for people to locate their responses.

Likert-type scales (Figure 2, p. 61), using anchors on the ends (e.g., strongly disagree to strongly agree) are often used; middle scores can be labeled (e.g., mildly agree) or not, provided there are 5 to 7 response choices and a number corresponding to each (e.g., "I think that my fellow workers follow safe work practices. Strongly Agree 1 2 3 4 5 6 Strongly Disagree."

Finally, sampling must be considered. Collecting data from sufficient sample size is important; gathering only a few responses in a company of thousands will not likely yield useful information on employees' perceptions or behavior.

For most basic surveys, a target of 100 or 150 responses should provide sufficient statistical power to detect any effects that are present (Cohen, 1992). However, for companies with fewer employees, the goal should be to sample all employees. In addition, for the sample to be externally valid (i.e., generalizable), it must adequately represent the population of workers from which it is drawn. Thus, sampling only managers will only tell one about those managers, but not about line employees.

As such, recruitment efforts should ensure broad participation, perhaps by including small incentives or by making it clear that the company values employee feedback; will use it to improve the company; and will keep all responses confidential to protect employees and to encourage them to provide honest input.

References

Bailey, C. (1997, Aug.). Managerial factors related to safety program effectiveness: An update on the Minnesota Perception Survey. *Professional Safety, 42*(8), 33-35.

Bailey, C.W. & Petersen, D. (1989, Feb.). Using safety surveys to assess safety system effectiveness. *Professional Safety, 34*(2), 22-26.

Blair, E.H. & O'Toole, M.F. (2010, Aug.). Leading measures: Enhancing safety climate and driving safety performance. *Professional Safety, 55*(8), 29-34.

Carder, B. (2003). A survey-based system for safety measurement and improvement. *Journal of Safety Research, 34*(2), 157-163.

Cohen, J. (1992). A power primer. *American Psychologist, 112*(1), 155-159.

Erickson, J.A. (1994). The effect of corporate culture on injury and illness rates within the organization. *Dissertation Abstracts International, 55*(6).

Erickson, J.A. (2008, Nov.). Corporate culture: Examining its effects on safety performance. *Professional Safety, 53*(11), 35-38.

Fowler, F. (1995). *Improving survey questions: Design and evaluation.* Thousand Oaks, CA: Sage Publications.

Ivers, R., Senserrick, T., Boufous, S., et al. (2009, Nov.). Novice drivers' risky behavior, risk perception and crash risk: Findings from the Drive Study. *American Journal of Public Health, 99*(9), 1638-1644.

Johnson, S. & Hall, A. (2005). The prediction of safe lifting behavior: An application of the theory of planned behavior. *Journal of Safety Research, 36*(1), 63-73.

O'Toole, M. (2002). The relationship between employees' perceptions of safety and organizational culture. *Journal of Safety Research, 33*(2), 231-243.

O'Toole, M. & Nalbone, D.P. (2007). Is safety climate a barometer of safety results? *Proceedings of ASSE's Safety 2007, Las Vegas, NV, USA.*

Peterson, D. (2005, Jan.). Safety improvement: Perception surveys can reveal strengths and weaknesses. *Professional Safety, 50*(1), 45-48.

Seo, D-C. (2005). An explicative model of unsafe work behavior. *Safety Science, 43*(3), 187-211.

Zohar, D. (1980). Climate in industrial organizations: Theoretical and applied implications. *Journal of Applied Psychology, 65*(1), 96-102.

Zohar, D. (2005). A multilevel model of safety climate: Cross-level relationships between organization and group-level climates. *Journal of Applied Psychology, 90*(4), 616-628.