



Projecting the Next Decade in Safety Management

A Delphi Technique Study

By SHAWN J. ADAMS

Asbestos liability. The sharp rise in workers' compensation rates in the 1980s. The increasing role of ergonomics and human factors. Many organizations were caught unprepared to deal with these issues and experienced negative financial outcomes as a result.

To help firms better prepare for such issues, safety professionals must attempt to project future trends in their area of specialization that could affect their employer's future profitability. Such forecasting can be difficult since people inherently assess matters from their own perspective and based on their own experiences. Furthermore, when soliciting input, people

often seek out those in the same geographic area and with similar life experiences. This biases any projections developed.

To predict the future accurately, one must have a method that enables educated predictions about the future, from a diverse group, and within budget restrictions. The Delphi Technique is one such method.

METHODOLOGY

The Delphi Technique used for this study was selected based on several criteria. Developed by the Rand Corp., it lends itself to problems without "precise analytical techniques [that] can benefit from subjective judgments on a collective basis" (Linstone and Turoff 4). The technique provides "a set of procedures for formulating a group judgment for subject matter where precise information is lacking" (Dalkey, et al 1). It can also be used "to obtain opinions on what the future holds" (Helmer 2).

In addition, Delphi also provides a broad representation of diverse backgrounds and prevents participants with strong personalities from dominating the group, thus preventing the "bandwagon effect" (Brown 2). In fact, group homogeneity and response anonymity are vital to preserving validity (Linstone and Turoff 4). Furthermore, the technique allows experts from around the nation to provide feedback to participants regarding group responses. It is also effective for research when cost and time make group meetings impractical (Linstone and Turoff 4).

Delphi was also selected for its reliability. In the early 1950s, the technique was used to predict traffic fatality figures and estimate bombing requirements needed to reduce U.S. munitions output to certain levels in the event of a war with the Soviet Union (Dalkey and Helmer 1). Delphi has been employed in each military service as well as by government agencies such as the DIA and CIA, and firms such as TRW, Martin-Marietta, McDonnell Douglas and Monsanto Chemical (Dalkey, et al ii, iii). In 1985, Dillon reported that 50 to 100 corporations were using Delphi as a planning tool (24). Clearly, the technique is a recognized method for predicting the future.

For this study, a list of 120 ASSE chapter presidents (2000-2001) was obtained in July 2000; these individuals served as the group of experts, known as the Delphi Panel. All received a letter of introduction and explanation (this process began in September 2000 and continued through February 2001).

In the survey instrument, respondents were asked an open-ended question regarding their predictions about safety for the remaining decade. Participants were asked to identify "up to 10 trends you feel the safety profession will experience between now and Dec. 31, 2009."

After four weeks—the end of Round One—54 people had responded. Those who had not were contacted again. Throughout the proceeding rounds, any participant who did not respond was contacted multiple times, since s/he had indicated some interest in participating based on responding to Round One.

The Delphi Panel provided almost 200 predictions. Repeat predictions, as well as those that were not safety-related, not

general to the entire field or incomplete, were removed, leaving a total of 168 predictions.

In Round Two, panel members received the list of 168 recommendations and were asked to identify their top 25 predictions. During Round One, panelists had "brainstormed" ideas; this produced quantity. In Round Two, the focus was on quality, as the panel identified which predictions were most likely to occur.

A total of 35 ASSE chapter presidents completed Round Two. Results were tallied, and predictions falling into the top quartile—46 in all—were targeted for further study.

In Round Three, respondents were asked to rank the 46 predictions based on a one-to-four Likert scale (on which four was "very likely"; three "somewhat likely"; two "not likely"; and one "very unlikely"). Respondents ranked each prediction "based upon its likelihood to occur between now and Dec. 31, 2009." Thirty-three chapter presidents completed this round.

In Round Four, respondents were again presented with the 46 predictions, as well as information on how they had rated each during Round Three. In addition, respondents received the median and interquartile range as required by the Delphi Technique (Helmer 8). The median was used for consensus during the study because the median (as opposed to the mean) helps reduce the trend toward conformity (Dalkey and Helmer; Dalkey 3).

At the end of this round, 33 respondents remained in the study. Cyphert and Gant conclude that an attrition rate of approximately 38 percent of those who initially agreed to participate is acceptable. The rate for this study was 38.9 percent. It has also been reported that validity and

Panel Predictions

Following is a list of the 46 trends identified by the Delphi Panel. Descriptive statistics are provided to indicate agreement within the panel. Predictions are listed from highest to lowest mean. For predictions with identical means, listing order is based on lower standard deviation. If both measures are identical, then predictions are listed together. Median and mode are also provided with statistical reporting in a mean/median/mode/standard deviation format.

Prediction 1

Information such as programs, manuals and JSAs will be maintained on computer. All safety/health professionals will be expected to use this technology. 3.85/4.00/4.00/0.3641.

Prediction 2

Companies and safety professionals will have to address the challenges of an aging workforce. 3.82/4.00/4.00/0.3917.

Prediction 3

The industry will experience a significant increase in the use of computer-based training products to accomplish necessary safety training. 3.67/4.00/4.00/0.4787.

Prediction 4

Musculoskeletal disorders will continue to account for the highest percentage of injuries. (This prediction tied with the following prediction, having the same mean, median, mode and standard deviation.) Safety training will increasingly be state-of-the-art, with aids such as PowerPoint being used. 3.61/4.00/4.00/0.6093.

Prediction 6

New OSHA recordkeeping requirements will become effective. 3.52/4.00/4.00/0.7953. (Author's note: This recommendation was developed in

September 2000. OSHA has announced that the new recordkeeping standard will take effect Jan. 1, 2002.)

Prediction 7

The cost of injuries will increase due to changes in the healthcare industry. 3.49/4.00/4.00/0.6185. (Author's Note: A Towers Perrin survey predicts an average increase in healthcare rates of 13 percent for 2001, the second straight year of double-digit increases. More than 90 percent of those surveyed expect these double-digit increases to continue over the next few years. See www.numews.com/archives/lh_archive/2001/101-31/1200005doubledigit.asp.)

Prediction 8

Safety as a career field will continue to lag behind engineering and computer science. 3.42/4.00/4.00/0.8303.

Prediction 9

Safety professionals will be responsible for emergency response planning at their respective facilities. 3.39/3.00/3.00/0.6093.

Prediction 10

The safety profession will continue to show management that "safety" can affect the company's bottom line. 3.33/3.00/4.00/0.6922.

Prediction 11

Multinational mergers will continue, requiring safety issues to be more global. 3.30/4.00/4.00/0.6093.

Prediction 12

Safety standards and regulations will be more performance-oriented, allowing latitude in enforcement, but requiring a more in-depth knowledge of safety. 3.30/3.00/3.00/0.6366.

Prediction 13

The trend toward greater responsibilities for safety and health professionals will continue, but there will be little increase in

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Panel Predictions (con't)

resources to accomplish those responsibilities. 3.21/3.00/3.00/0.6963.

Prediction 14

An ergonomics standard will be passed, but it will be greatly diluted in content and requirement. (Author's Note: Although Congress rescinded the Ergonomics Program Management Standard in March 2001, the issue remains a topic of debate. The Dept. of Labor expects to announce its plans for further rulemaking in the near future.) (This prediction was tied with the following prediction, having the same mean, median, mode and standard deviation.) An increasing number of safety tools will be available online, much like the prepaid accounting and law programs currently available. 3.15/3.00/3.00/0.7550.

Prediction 16

Rising medical and insurance costs will have the greatest influence on employer safety policies. 3.12/3.00/3.00/0.8200.

Prediction 17

Safety professionals will be more mobile (e.g., change firms more often). (This prediction tied with the following prediction, having the same mean, median, mode and standard deviation.) Occupational stress factors will need to be addressed more thoroughly. 3.09/3.00/3.00/0.6784.

Prediction 19

The industry will experience a shift in how safety is measured, moving from lagging indicators (such as incidence rates) to proactive indicators that will measure unsafe acts, unsafe conditions and root causes. 3.09/3.00/3.00/0.8427.

Prediction 20

Increased cooperation will be required between OSHA and high-hazard industries. 3.00/3.00/3.00/0.7906.

Prediction 21

More universities/colleges will offer degree programs to handle the demand for trained safety professionals. (This prediction tied with the following prediction, having the same mean, median, mode and standard deviation.) The human factors/ergonomics specialist will play a significant role in safety, equipment/building design and the general work environment. 2.97/3.00/3.00/0.6366.

Prediction 23

More "divisional" and "site-specific" safety personnel will be in place. 2.97/3.00/3.00/0.6840.

Prediction 24

The U.S. will continue to lose heavy industry to developing countries. 2.97/3.00/3.00/0.8472.

Prediction 25

The trend of empowering employees will continue, which will affect the way safety is administered. 2.93/3.00/3.00/0.6093.

Prediction 26

The desire to reduce insurance losses will be the primary motivator behind successful safety management systems. 2.93/3.00/3.00/0.7475.

Prediction 27

It will become more obvious that safety professionals are advisors rather than the person to blame for a poor safety culture. (This prediction was tied with the following two predictions, having the same mean, median, mode and standard deviation.) a) "Safety culture" will become a more-common term. This culture must be developed and many will be heading in that direction. b) Volunteerism in professional associations will continue to decline. 2.94/3.00/3.00/0.7882.

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reliability of the Delphi Technique does not significantly improve with more than 30 participants. According to Dalkey, although reliability increases the larger a panel gets, the increase is only slight once 30 participants is surpassed. Others report that exceeding 30 participants results in few new ideas, regardless of group size (Delbecq, et al).

A Wilcoxon-Sign test was performed at the end of Round Four; it showed no significant change at the 0.05 level between Rounds Three and Four. Based on this finding, the Delphi Panel was concluded. A total of 21 states had been represented (California and Florida n=4; Indiana and Washington n=3; North Carolina and Tennessee n=2; and Alaska, Alabama, Arizona, Connecticut, Iowa, Illinois, Kansas, Massachusetts, Maryland, Minnesota, New Jersey, New Mexico, Ohio, Texas and Utah n=1).

In addition, a Kendall's Coefficient of Concordance was performed on the results. Kendall's W was 0.226. A score of 1.00 indicates total agreement, while a 0.00 indicates no agreement. The 0.226 indicates weak agreement between panel members on all predictions for the group as a whole. This weak score could reflect the fact that participants were from different regions, represented different industries or had dissimilar life experiences. Despite this, the results still provide valuable information for safety professionals.

CONCLUSIONS

The projections of the Delphi Panel can serve as a valuable planning tool for safety professionals. The panel sees a profession that will be more global as well as more reliant on computers. Professionals will increasingly be expected to explain how their efforts contribute to the bottom line, which will continue to be negatively affected by increasing medical costs and an aging workforce. The Delphi Panel also saw little change in the way OSHA operates, although certain new regulations (in areas such as ergonomics) are expected.

The accuracy of these projections remains to be seen (Paliwoda 31). Although the technique does not produce 100-percent accurate results due to the subject with which it deals, it is accurate enough to produce results on which the government, educational institutions and the Fortune 500 rely (Adams; Dillon; Ferry).

During the course of this study, two predictions, one dealing with OSHA's recordkeeping standard and another covering ergonomics, came to the forefront. This study should be reviewed at the end of this decade to assess the ultimate accuracy of the remaining predictions. ■

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Panel Predictions (con't)

Prediction 30

OSHA will require industry to complete safety program self-assessments. (This prediction was tied with the following prediction, having the same mean, median, mode and standard deviation.) The CSP designation will become the norm for practicing safety professionals. 2.85/3.00/3.00/0.7550.

Prediction 32

More people will be employed via staff leasing. 2.85/3.00/3.00/0.9722.

Prediction 33

Successful businesses will manage safety programs through motivated employee-based teams. 2.79/3.00/3.00/0.7398.

Prediction 34

A Safety Program Management Standard will be published; it will outline requirements for being recognized as actually having a safety management program. 2.76/3.00/3.00/0.8671.

(Author's note: This program remains in the draft stage. See www.osha-slc.gov/SLTC/safetyhealth/index.html.)

Prediction 35

The current emphasis on behavioral safety techniques will be discredited due to the inability to effect a long-term change in behavior. 2.76/3.00/3.00/0.9024.

Prediction 36

Safety professionals and industrial hygienists will merge closer to unify the profession to a greater degree than is currently found. 2.73/3.00/3.00/0.8013.

Prediction 37

The adversarial relationship between OSHA and industry will improve, resulting in greater participation in programs such as VPP. 2.70/3.00/3.00/0.8095.

Prediction 38

"Turf wars" between industrial hygienists and safety professionals will continue. 2.70/3.00/3.00/0.8472.

Prediction 39

OSHA will allow qualified consultants to conduct audits of workplaces in an effort to achieve self-regulation. 2.70/3.00/2.00/0.9838.

Prediction 40

There will be little change in the way OSHA does business. 2.67/3.00/3.00/0.6922.

Prediction 41

Outsourcing of the safety function will result in negative effects. 2.67/3.00/3.00/0.8898.

Prediction 42

Robotics will become the norm; to be effective, safety professionals will need to understand robotics safety. 2.58/3.00/3.00/1.0317.

(Author's Note: This is the only prediction with a standard deviation above 1.00.)

Prediction 43

Environmental engineers will gain in stature over safety engineers. 2.55/3.00/3.00/0.7942.

Prediction 44

Unions will play a greater role in safety training as part of a more-cooperative effort between labor and management. 2.42/2.00/2.00/0.8671.

Prediction 45

The profession will move away from the injury rate as a measure of safety. 2.33/2.00/3.00/0.7773.

Prediction 46

ASSE and AIHA will become a united organization. 2.07/2.00/1.00 & 2.00/0.9334. (Author's Note: This was the only bi-modal response. The standard deviation is based on a bi-modal response. However, considering the low overall mean, the Delphi Panel indicated that this prediction is unlikely.)

The projections are a valuable planning tool for safety professionals. The panel sees a profession that will be more global and more reliant on computers.