Benchmarking Safety Culture Survey Practices in the Chemical Process Industry

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Abstract

Safety culture[1] surveys assess employees' shared perceptions of the policies, procedures, and practices concerning safety. Benchmarking is the process of comparing one's business processes and performance metrics to industry bests or best practices from other companies. In this study, we were interested in benchmarking the *practice* of conducting safety culture surveys and various *details* about these practices. Some specific research questions we were interested in answering were (1) Which organizations conduct safety culture surveys and how frequently do they do so? (2) What kinds of questions are asked (process safety, personal safety)? (3) Who completes the survey? (managers, internal/external contractors) (4) How are the survey results used and do they help? In this study, we focus on 41 survey responses from 41 unique operating companies in the oil and gas and chemical processing industries. A majority of the respondents reported conducting a safety culture survey and with some frequency (e.g., annually). Respondents indicated that surveys were conducted both internally as well as by external vendors. A wide array of reasons were given for conducting the most recent safety culture survey including new safety initiatives, new leadership, and the desire to continuously improve. Data were also gathered on concerns or obstacles raised by individuals about the survey, who completed the most recent survey, response rates, employee reactions to the survey, languages the survey was administered in, who the results were disseminated to, and post-survey actions. Respondents estimated that approximately 25% of the survey questions concerned process safety and about 51% of the survey questions concerned personal safety. This study provides some initial information about safety culture survey practices which can inform and facilitate the benchmarking of safety culture survey scores across organizations.

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[1] *Safety Culture* is defined shared assumptions, values, and beliefs about safety that characterize an organization. As psychologists, we believe that surveys are more likely to capture "safety climate," (employees perceptions about safety policies, practices, and procedures) but we recognize the chemical process industry tends to use the phrase "safety culture" more frequently, thus we use that phrase in this paper and the survey. It should be noted that "safety climate" surveys have been conducted by industrial/organizational psychologists since at least 1980 (Zohar, 1980).

Introduction

The first use of the phrase "safety culture" has been attributed to the International Atomic Energy Agency when analyzing the nuclear reactor accident at Chernobyl (Lee, 1998). Safety culture has also been identified as a contributing factor in various incidents including NASA's Challenger (1986) and Columbia (2003) catastrophes, Kings Cross fires, the Piper Alpha explosion (1988), and the Clapham Junction rail crash. As a result, organizations have sought to measure their safety culture in various ways. The primary way that organizations have done this through a survey of company representatives or a sample of employees. However, details about these surveys and the process of administering them in practice (not for research purposes) is not well-documented. Correspondingly, we sought descriptive information about the practice of conducting safety culture surveys by the oil and gas and chemical processing industries. Specifically, we were interested in what these surveys look like (the nature of the questions asked), who they are administered to (various levels of employees), how frequently they are conducted, and if there have been any concerns expressed about the practice of administering these surveys.

By pursuing this information, we sought to benchmark the practice of conducting safety culture surveys (rather than benchmarking the actual survey data). Benchmarking is the process of comparing one's business processes and performance metrics to industry bests or best practices from other companies. In this study, we were interested in all aspects of this process including who, what, where, when, why, and how. Ultimately, this information would facilitate the ability to benchmark safety culture survey data scores across organizations.

Some specific research questions we were interested in answering were:

(1) Which organizations conduct safety culture surveys and how frequently do they do so and when was the last survey conducted?
(2) What kinds of questions are asked in the surveys (process safety, personal safety)?
(3) Who completes the survey (managers, internal/external contractors) and what was the response rate?
(4) In what languages is the survey administered in?
(5) How are the survey results used and who were they disseminated to?

Method

Over 4000 individuals on Texas A&M University's Mary Kay O'Connor Process Safety Center listserv were invited to participate in a safety culture survey benchmarking survey in late 2015. One hundred seventy-two individuals responded and of them, 126 identified the type of company they work for based on the following categories: 76 worked in operating companies, 23 worked in consulting firms, 12 worked in engineering, procurement, and construction (EPC) firms, and 15 worked in "other" (government agencies, educational institutions).

For this study, we were particularly interested in operating company survey practices. Thus, our unit of analysis was at the company-level. Correspondingly, we only wanted one response from each company. Thus, we started with the 76 responses from representatives of

operating companies and reviewed the company names provided for these responses. Of these 76 responses, 52 respondents provided the name of the company they worked for. Of these, 41 unique company representative responses could be identified. When selecting a response for a company in which more than one response was provided, we chose the most complete response and if that was debatable, we chose the first response. **The remainder of the analyses were limited to the 41 responses from unique operating company representatives.** The majority of the operating companies were in the oil and gas (e.g., Ameco, BP, Chevron, ConocoPhillips, Exxonmobil, Qatar Petroleum, TOTAL) or chemical processing industry (e.g., Dow, Petrochemical Corp of Singapore).

Results

Safety Culture Survey Administration

The first question we asked about safety culture surveys was **"has your company ever conducted a safety culture survey**?" Thirty respondents (73%) indicated that yes, their company had administered a safety culture survey and the remaining (11) respondents checked no.

The next question we asked was **how frequently** did they conduct safety culture surveys. Seventeen respondents provided an answer to this question (24 left it blank). One respondent indicated biannually, 4 respondents indicated annually, 1 checked every other year, 3 respondents checked every three years, 3 additional respondents checked 4-5 years, and 1 respondent checked more than every five years. Four respondents checked "ad hoc/as needed."

Most Recent Safety Culture Survey

We asked was **when** was the last safety culture survey administered, nineteen respondents provided a year (22 left it blank). Seven indicated they had administered a survey in the last year (2015), 4 the year prior (2014), and 3 the year before that (2013). The remaining 5 responses were for years ranging from 2000 to 2012.

The remainder of the survey questions concerned their most recent safety culture survey administration. Of the 16 respondents who provided a response to the question **who conducted** the survey, 10 indicated the survey was done in-house and six indicated the survey was conducted by an external vendor or party. Of the 14 who provided sufficient information, only 3 reported the same instrument (DuPont's Safety Perception Survey).

When asked **who completed the survey**, respondents were prompted with the following categories and the corresponding number checked each option: 14 top management, 19 middle management, 17 technical staff, 17 operations staff, 6 contractors, and 8 others. We also asked the overall approximate response rate and of the 16 who provided responses to this question, the average **response rate** was 73.13% ($SD = 20.28\%$).

Almost all of the respondents indicated that the survey was administered in English. Five respondents indicated that the survey was administered in another **language** beyond English

including Portugese, Hindi, Gujarati, French, Dutch, Indonesian, and the language of the respective country.

We asked **why** the survey was conducted and listed two possible examples within the question – part of a new initiative, in response to an incident. Eighteen respondents provided an answer to this question (23 left it blank). Responses were coded as follows: 5 new leadership, 4 new initiative, 4 assess/measure safety culture, 2 continuous improvement, 2 monitor climate regularly, and 1 tied to training.

Respondents were asked if there were any **concerns or obstacles** raised by individuals outside of safety (e.g., legal, marketing) prior to the administration of the survey and if so, to briefly describe these concerns. Of the18 respondents who provided an answer to this question (23 left it blank), 15 wrote "no," one wrote "yes," and two wrote they were not sure. The one person who wrote yes elaborated on a larger concern for the company involving politics and economics that appeared to extend well-beyond the survey.

Respondents were also asked, "in general, how did **employees react**?" Of the 17 respondents who answered this question, nine expressed a positive sentiment with comments like "Very positive, very informal conversational survey. Measuring culture not compliance," and "Positively for the most part. There are always a few cynics!" and 8 respondents expressed more mixed reactions like "Well. Voiced some legitimate concerns. Also became a platform for employees to discuss other concerns outside safety" and "Employees directed involved in the survey had a positive reaction in general. The same is not true with people not directly involve[e]d in the survey, which react with ceticism [cynicism] concerning to the aim and result of such survey."

When asked who the **results** were **disseminated** to, 12 respondents indicated all employees and eight respondents indicated results were only disseminated to management.

In terms of **post-survey actions**, of the 18 respondents who answered this question (23 left it blank), 1 said "none," 1 said they did not know, and 16 said changes were made. A wide range of changes were listed. Some examples included: (1) "each facility HSE committee follows up with any actions identified by the surveys with the timelines," (2) "Implementation of a greater number of leadership field audits and more field presence. Began communicating status of site discipline program regularly - so people are aware there are consequences for intentionally unsafe behaviors," and (3) "Targets have been decided including actions plans; review of Company internal requirements and directives related to process safety; improvement of ways to collect data used to verify safety indicators; review safety indicators; reinforcement of train[i]ng and dissemination of safety process culture to employees; implementation of workshops aiming dissemination and analysis of process safety accidents in the Company; implementation of workshop comprising analysis of results of auditing executed by Petr[o]leum National Agency regarding process safety aspects."

Finally, respondents estimated that approximately 25% of the survey questions concerned **process safety** culture and about 51% of the survey questions concerned **personal safety** culture.

Discussion

This study provides some initial information about the use of safety culture surveys which can inform and facilitate the benchmarking of safety culture survey scores across organizations. Based on the data collected in this survey, there does not appear to be one survey instrument that has been used extensively by multiple operating companies. However, there are a large number of safety culture and safety climate scales freely available in the research literature. Further, the publicly available BP Process Safety Culture Survey presents an opportunity for a benchmarking tool for the chemical industry. Should it be perceived and utilized this way, organizations would be able to compare their personal and process safety cultures to other organizations and identify areas where they may need to intervene or probe further.

References

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