EVALUATING AND MODELING SAFETY CULTURE

İldil İŞIK, Nevin KILIÇ, Çiğdem VATANSEVER, Elif SUNGUR
İstanbul Bilgi University, Fatih Sultan Mehmet Vakif University, Namık Kemal University, Maltepe University
İstanbul, Turkey
For correspondance: ildil.isik@bilgi.edu.tr

Introduction

Safety culture is defined as values, norms, guiding beliefs, and understandings that are shared by members of an organization and shape the way people think, feel, and behave in organizational settings. The aim of our study is to develop a local safety culture measurement tool for Turkey and to conceptualize safety culture covering four dimensions: management commitment, worker-related safety culture, system safety rules and procedures, involvement, personal priorities, need for safety and physical work environment. Even if our initial attempt was to follow up traditional techniques of developing an attitude survey, the series of studies showed us crucial methodological issues to care in the process of developing a valid and reliable tool to analyze safety culture in organizations. This poster presents major facts that we have realized throughout the studies we had conducted. The deductions from each phase are discussed to propose a methodology for measuring safety culture.

Study I

Aim of the study

This study is the first phase of safety culture project covering literature review, item formation, expert review of the items developed, and preliminary testing of questionnaire with a pilot study.

Method

Participants: 81 employees in a production firm (43% operators, 16% first line managers, 41% data about position is missing).

Material and Procedure: The items are generated and collected from three sources: Study done in Turkey (Demirbilek, 2005), previous studies in the literature (e.g. HSE, 2005), and items generated by analyzing qualitative data from the focus group records done by authors. Items were presented as two sections: evaluation of overall workplace with 76 statements describing variety of safety related conditions, procedures and behaviors. In the second section with 16 items, we asked participants to evaluate safety orientation of the overall management team in their organization. 5 point Likert scale was used. Data were collected in March, 2010.

Results

We recognized that the number of items are high and some of the items are too long to be understood especially by the participants with lower education. Internal consistencies are acceptable (Cronbach’s alpha, for workplace section: 0.84, management section: 0.83).

Lessons learned

- Short and simple expressions are better.
- In the workplace section of questionnaire covered also some dimensions related to management safety orientation, this creates a confusion especially with the second section. Items have to be re-categorized.
- In the workplace section, evaluation is toward external factors but in some of items, behavior of the respondent is highlighted. Re-categorization is needed.
- There should be a site visit and simple safety audit prior to survey. Without knowing the organization and its operations generally and jobs of respondents specifically, attempts to measure safety culture is delicate.
- Larger scale is needed for factor analysis.
- There is a lack of item analysis.

Study II

Aim of the study

We conducted second study to test the revised version of our questionnaire.

Method

Participants: First sample was 210 supervisors with technical responsibilities from a geographically diverse electricity distribution firm. Second sample included 70 operators from a production company located in Istanbul. Data were collected in May-June, 2010.

Material and Procedure: Revised questionnaire had 95 items. Original workplace section from Study I now had 61 items. Three sections were added to evaluate: a) top management (13 items), b) colleagues and subordinates (10 items), and c) self (11 items). Multi-factor Leadership Questionnaire (MLQ, 36 item, Bass, 1990) was also used by considering leadership style of the managers that the participants report to as a mediating variable.

Results

Items to be revised were identified based on item analysis results. Principle component analysis of questionnaires didn’t provide components theoretically meaningful especially in the supervisors sample. We observed high level of social desirability and response sets in the self-evaluation questions. Variance was higher in the section related to evaluation of colleagues and subordinates. The number of missing items in MLQ section was very high.

Lessons learned

- Workplace evaluation contained two types of items related to: a) prevalent norms, assumptions and behavioral patterns, b) the perceptions of participants on the existing safety culture. We realized that for management and supervisors, if we are going to get valid data as long as the procedure, system or application specified in that item does really exist in the organization. These type of questions should be used in a checklist format to verify each item with managers and then perceptions should be investigated on a tailored questionnaire.
- Geographically diverse organizational structure did create unique sub-samples since safety related facilities and interventions were not homogeneous even if the main operation is the same. Especially second type of items revealed low level of internal consistency since the categories were diverse in terms of safety culture.
- It is crucial to care about where and when to collect data. Both of the samples participated survey during their attendance to a training program on safety. Motivation was low.
- Surveys has to be shortened.

Study III

Aim of the study

In order to handle observed drawbacks of previous studies in measuring safety culture, a theoretical model based on System Theory and a methodology containing not only quantitative but also qualitative techniques were developed. We proposed to integrate Fuqua & Newman’s Social System Model (2002) and Kast & Rosenzweig’s System Theory (1988) as a conceptual framework (Figure 1) to evaluate safety culture in an organization.

Our methodology consists of: a) initial meeting with HR and Safety Managers/Officials to review existing systems and understand the organization, b) review of reports, publications, safety related activities, and related materials, c) plant visit and observation, d) semi-structured one-to-one interviews with middle-line management in production and maintenance, top management, union representatives, e) participative observation of safety committee meetings, f) focus groups with formal groups, g) semi-structured one-to-one interviews with a sample of operators, h) structured interviews with a sample of operators, i) review meetings with managers about the findings of qualitative data collection phase, j) customization of safety culture questionnaire based on qualitative data, k) data collection with quantitative tool from all of the members of the organization, and l) feedback to management and employees.

Method

Participants: First of all, we searched for an organization to commit this large scale project and we started this study in April, 2011 in an international factory functioning in steel industry. Total number of employees is 392. Phases between “a” to “j” has already been completed. Approximately 100 members from defined categories participated in the qualitative phase. Survey will be conducted in October and project will be finalized by the end of November.

Material and Procedure: Semi-structured interviews and focus groups were tape recorded and transcribed by the authors. For the structured interview phase, we had also developed special survey forms with fill-in-the-blank format to get concrete wordings of safety culture commonly used among operators. We also used a specially designed Hazard Perception scale.

Results

Original item pool that we have used in previous studies are now being customized based on the data obtained from transcribed records. Customized items are conceptually categorized into the components of the Integrated System Model.

Lessons learned

- Qualitative measures must certainly be a major method in safety culture research. In-depth interviews and focus group studies provide very strong sense of safety culture and provides data with higher internal validity.
- Safety culture is the subset of a corporate culture. It is not possible to investigate safety culture in isolation.
- Job related attitudes like job satisfaction, organizational commitment, engagement and motivation are assessed as very important mediators toward safe operations.
- Managerial conducts and their commitment to safety is detected by the employees and they are keen on consistency.

Discussion

Researchers (e.g. Guldenmund, 2001) recognize the efforts to construct safety climate and culture questionnaires and also weaknesses of these tools to successfully expose the core of data obtained from transcribed records. Customized items are conceptually categorized into the components of the Integrated System Model.

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References