Safety climate mediating the relationship between safety leadership and safety performance in petrochemical industries

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OUTLINE

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1. INTRODUCTION

• Occupational accidents or safety performance are affected by complex reasons.

Fig. 1. A hypothesized model of safety culture causality
1. INTRODUCTION (Cont’d)

- Past empirical studies from some industries support this claim
  - Food and beverage industry (Barling, Loughlin, & Kelloway, 2002)
  - Metal processing industry (Zohar, 2002)
  - Glassware manufacturing industry (Clarke & Ward, 2006)
  - Higher education industry (Wu, Chen & Li, 2008)
1. INTRODUCTION (Cont’d)

- Based on empirical evidence, the following hypotheses can be asserted:
  - **H1**: Safety leadership positively impacts safety climate in petrochemical industries.
  - **H2**: Safety leadership is positively related to safety performance in petrochemical industries.
  - **H3**: Safety climate partially mediates the effects of safety leadership on safety performance in petrochemical industries.
2. METHOD

• Population
  – 1556 employees from 23 plants in seven divisions of a petrochemical firm in central Taiwan.
  – 1460 employees were male (93.83%) and 96 were female (6.17%).
  – The research adopted simple random sampling to select 1,200 participants.
2. METHOD(Cont’d)

• Sample
  – 1,041 viable responses were received (response rate of 86.75%).
  – Randomly splitting those responses into two sub-sample groups (N1 = 520 and N2 = 521).
  – The first sub-sample (N1) used for the pilot study.
  – The second sub-sample (N2) verified the relationship among safety leadership, safety climate, and safety performance.
2. METHOD (Cont’d)

• Instrument: Questionnaire
  1) Basic information
  2) Safety leadership scale (SLS), five-point Likert scale
  3) Safety climate scale (SCS), five-point Likert scale
  4) Safety performance scale (SPS), five-point Likert scale
2. METHOD (Cont’d)

- Basic information
  - Three organizational factors (nature/division, plant size, safety audit frequency)
  - Seven individual factors (gender, age, job tenure, title, accident experience, safety training experience, shift-work)
2. METHOD (Cont’d)

• Safety leadership scale (SLS)
  – 15 questions cover the dimensions of safety coaching, safety caring and safety controlling.
  – The eigenvalues of factors > 2, explained 71.39% of the total variance; Cronbach’s α coefficients > .89.
2. METHOD (Cont’d)

• Safety climate scale (SCS)
  – 15 questions covering the dimensions of employee safety commitment, risk perception, and emergency response.
  – The eigenvalues of factors > 2, explained 62.57% of the total variance; Cronbach’s α coefficients > .79.
2. METHOD (Cont’d)

• Safety performance scale (SPS)
  – 16 questions cover safety inspections, accident investigations, safety training and safety motivations.
  – The eigenvalues of factors > 3, explained 79.79% of the total variance; Cronbach’s α coefficients > .92.
2. METHOD (Cont’d)

• Data analysis
  – Statistical package for social science (SPSS 12.0) and analysis of moment structure (Amos 5.0) were used for data analysis.
  – Structural equation modeling (SEM) analysis was used to test the fit of the hypothesized model.
3. RESULTS

- **Sample Profile** \((N_2 = 521)\)
  - 478(92%), male; 40(8%), female
  - Average age: 35.5 years \((SD = 7.30)\)
  - Average working experience: 10.0 years \((SD = 6.73)\)
3. RESULTS (Cont’d)

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<th>Model fit indexes</th>
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<th>Safety performance</th>
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Table 1 Indexes of fit for the measurement models and the structural model
3. RESULTS (Cont’d)

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Table 1 Indexes of fit for the measurement models and the structural model
3. RESULTS (Cont’d)

Fig. 2. Structural equation modeling: The finalized model
3. RESULTS (Cont’d)

• The hypothesized relationships are statistically significant:
  – The effect of safety leadership on safety climate was .82 (t = 12.59, \( p < .001 \))
  – The effect of safety leadership on safety performance was .61 (t = 7.79, \( p < .001 \))
  – By way of safety climate, the effect of safety leadership on safety performance was .29 (t = 4.12, \( p < .001 \)).
4. DISCUSSION

- Safety climate played a mediator, which was supported by previous studies (Barling et al., 2002; Clarke & Ward, 2006; Wu et al., 2008; Zohar, 2002).

- Within the local context, the direct effect of safety leadership on safety performance was greater than indirect effects, which diverged from the study of Wu et al. (2008).
4. DISCUSSION (Cont’d)

• Wu et al. (2008) indicated the indirect effect of safety leadership on safety performance was greater than the direct effect in a university setting.

• This difference may be related to organizational characteristics.
4. DISCUSSION (Cont’d)

• DeJoy et al (2010) suggested that an organization's core values impact occupational safety policy, thereby affecting the safety climate and performance.

• Manufacturing and education institutions have different cultural values, the overall effect on the relationship among safety leadership, climate, and performance also differs to some extent.
Acknowledgement

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