Toward a model for forming psychological safety climate in construction project management

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Abstract

The nature of construction projects and their delivery exposes participants to accidents and dangers. Safety climate serves as a frame of reference for employees to make sense of safety measures in the workplace and adapt their behaviors. Though safety climate research abounds, fewer efforts are made to investigate the formation of a safety climate. An effort to explore forming psychological safety climate, an operationalization of safety climate at the individual level, is an appropriate starting point. Taking the view that projects are social processes, this paper develops a conceptual framework of forming the psychological safety climate, and provides a preliminary validation. The model suggests that management can create the desired psychological safety climate by efforts from structural, perceptual, interactive, and cultural perspectives. Future empirical research can be built on the model to provide a more comprehensive and coherent picture of the determinants of safety climate. © 2014 Elsevier Ltd. APM and IPMA. All rights reserved.

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1. Introduction

The nature of construction projects and their delivery poses immense challenges to the safety of construction practitioners. Historically, attempts to reduce accidents in project settings have gone through three overlapping stages, i.e. the technical age, the human error age, and lately the socio-technical age (Reason, 1993). In the technical age people adopted technical measures to mitigate or prevent hazards and risks in the project *environment*, while the human error age focused on efforts to avoid malpractices of the *person* (i.e. project participants) in the project delivery process. However, "virtually all work injuries involve person-environment interactions" (DeJoy, 2005, p. 110). In the socio-technical age, great importance is therefore attached to both

the *person* and *environment* and their interactions. The notion of safety climate, which is derived from the organizational climate theory and serves as a schema for employees to interpret the environment and adapt behaviors accordingly, is central to accident prevention in the socio-technical age.

The central tenet of organizational climate is that, faced with stimuli in the environment, individuals generate perceptions, attach meanings, develop expectations regarding behavior-outcome contingencies and ultimately adapt their behaviors (Moran and Volkwein, 1992; Zohar, 1980). An issue of concern with the organizational climate construct is that it is too general to be meaningful (Schneider and Reichers, 1983). Researchers therefore contend that the organizational climate should have a specific referent, and safety climate is the organizational climate of safety. Zohar (1980) described organizational climate as "coherent sets of organizational perceptions, when shared and summarized for individual employees" (p. 96 & 97), and safety climate as "common perceptions regarding safety" (p. 98), claiming that safety climate can supplement organizational climate. Later on, Zohar (2003) specifically related safety climate to "shared

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perceptions with regard to *safety* policies, procedures, and practices" (p. 125). Hence, both organizational climate and safety climate are traditionally conceptualized and operationalized at group or higher levels.

However, climate can be a property of both the individual and the organization (Johnston, 1976). Safety climate can therefore be conceived as a psychological, a psychosocial, or a socio-cultural construct, and perceptions can be aggregated at either group, organization or other higher levels (Glendon, 2008). Psychological safety climate (PSC) is the conceptualization of safety climate at the individual level (Griffin and Neal, 2000; Morrow et al., 2010), and refers to the individual's perceptions of safety stimuli (including policies, procedures and practices) in the environment and serves as a frame of reference for guiding and directing appropriate and adaptive safety behavior in carrying out task activities. It forms the basis for safety climate at higher levels (Darr and Johns, 2004; James and James, 1989), is easier to measure and change compared with safety climate at higher levels (Guldenmund, 2010), and yet can be indicative of relationships at higher levels (Parker et al., 2003). Despite substantial research on safety climate and related outcomes, there is still paucity of research about how safety climate forms. Therefore, as an appropriate starting point to examine how safety climate forms at higher levels, this paper focuses on how to form a psychological safety climate.

The paper is structured as follows. First, it elaborates on the research question against the backdrop of safety climate research in construction. Second, it examines the contributing factors to the psychological safety climate from a four-perspective framework, and develops a model depicting the formation of psychological safety climate. Third, after discussing the feasibility of empirically testing the model, preliminary results of the validation of the model using data from a large scale questionnaire survey are reported. Finally, both theoretical and practical implications of the model are discussed, along with limitations.

In this paper, we propose to categorize relevant factors into general factors and safety-specific factors. For example, organizational climate concerns employees' perceptions of the general environment, whereas safety-specific climate (i.e. safety climate) refers to those perceptions about safety measures (including policies, procedures, and practices). Similarly, leadership can be defined as the process of influencing others to act as the leader intends, whereas safety-specific leadership refers to leaders' efforts toward safety (de Koster et al., 2011). Safety-specific factors (Barling et al., 2002; Conchie and Donald, 2008, 2009; de Koster et al., 2011; Kelloway et al., 2006) have recently been studied, and are more likely to be under the control of project team members compared with those general factors though some general factors, such as job demands, commitment, and leadership, have implications for safety performance (Nahrgang et al., 2007). Unless otherwise indicated, this paper takes all the factors as general factors.

2. Safety climate research in construction

Based on the review of studies from 1980s, Cooper and Phillips (2004) propose four directions of safety climate research, namely,

a) the design of psychometric measurement instruments and determination of the latent factor structure of the construct of safety climate; b) the development and test of theoretical models to identify antecedents of safety behavior and accidents; c) the examination of the relationship between safety climate and actual safety performance; and d) the exploration of the relationship between safety climate and organizational climate. Table 1 summarizes safety climate studies in construction since 2000 (Choudhry et al., 2009; Cigularov et al., 2010; Dingsdag et al., 2008; Fung et al., 2005; Gillen et al., 2002; Glendon and Litherland, 2001; Kapp, 2012; Lingard et al., 2010, 2012; Meliá et al., 2008; Molenaar et al., 2009; Pousette et al., 2008; Siu et al., 2003, 2004; Teo and Feng, 2009; Zhou et al., 2008, 2011). Two patterns are evident: a) the studies primarily focus on psychometric measurement issues of psychological safety climate, as noticed by Beus et al. (2010); and b) most of the studies concern the factor structure of safety climate scales and the predictive relationship between safety climate and related outcomes, as proposed by Zohar (2010). What is lacking in these studies, however, is the formation of psychological safety climate (Barling et al., 2002; DeJoy et al., 2004; Guldenmund, 2000; Zohar, 2010), which is the primary objective of this paper.

This research also has implications for construction project safety management practice. Project management involves sense-making (Thomas, 2000), and project management research calls for the examination of the social and human aspects of project works (Hanisch and Wald, 2011). Faced with seemingly stagnant safety performance after 2000 in the Hong Kong construction industry, researchers and practitioners began reflecting upon existing safety management systems and proposing new initiatives. One lesson learned is that, existing initiatives are deficient as they focus on "the internal and static aspects of the production (construction) system" (Koh and Rowlinson, 2012, p. 134). Hence, efforts from the social and dynamic aspects of construction organizing come to the fore in effectively implementing safety management systems. The safety climate theory views employees' safe behaviors as a function of their shared appraisals of safety policies, procedures and practices in the workplace, and hence captures the social and dynamic elements of the organization process. Yet another expected practical contribution as an anonymous reviewer mentions is that, the construction project manager as a facilitator of the project team would gain insight into how to create a safety climate and therefore determine suitable safe behavioral styles before the commencement of the project. This is especially relevant, against the backdrop of Robens-style occupational health and safety legislation which bestows construction project managers with considerable discretion, and consequentially tremendous safety responsibilities.

3. Sources of psychological safety climate

Safety climate is almost unanimously accepted as an aspect of organizational climate (Silva et al., 2004), which serves to describe and provide understanding of individuals' behaviors in organizations (Hellriegel and Slocum, 1974). An examination