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Factors affect companies' safety performance in Jordan using structural equation modeling

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ABSTRACT

This research examines effects of organizational, safety management, and work group level factors on safety self-efficacy, safety awareness, and safety behavior in Jordanian companies. A total of 324 surveys are collected. Structural equation modeling is then used for data analysis. Results reveal that management commitment, interrelationships harmony, continual improvement and employee empowerment significantly affect safety performance. However, blame culture obstacles spreading safety behavior through safety reporting system or reward system. For large-sized companies, top management, interrelationships, continual improvement, blameless culture, and employee empowerment significantly affect safety awareness and safety behavior. Still, top management should implement effective safety activities and management practices to enhance safety self-efficacy and safety behavior, respectively. For medium-sized companies, it is concluded that top management, as well as interrelationships, continual improvement, and empowered employees do not enhance a safety behavior. Thus, continual improvement and blameless culture should be well-established in safety management system to significantly affect safety behavior. In conclusions, the results of this research provide a valuable feedback to decision makers about the effectiveness of safety performance in Jordanian companies.

1. Introduction

Safety climate is a specific form of organizational climate, which influences safety behavior of employees at various organizational levels (Cooper and Phillips, 2004; Zohar, 1980) and refers to the degree to which employees believe true priority is directed to safety performance, and its measurement is thought to provide warning of potential safety problems (Lin et al., 2008).

Previous researches (Neal et al., 2000; Arezes and Miguel, 2008) showed that lower workplace accident rates are associated with improved safety climates. Therefore, substantial research efforts have been directed to examine the effectiveness of safety climate in various business applications. For example, Sukadarin et al. (2012) explored the perception of employees towards safety culture in a manufacturing industry by using safety climate questionnaire. Seven factors used to measure safety culture, including safety management system and procedure, management commitment, safety attitudes, workmate's influences, employee's involvement, safety knowledge, and safety behavior. The result showed that employees have positive perceptions towards safety management system and procedures, workmate's influence, employee involvement, safety knowledge and safety behavior. Granerud and Rocha (2011) examined influences of certified occupational and health management systems health and safety on certified Danish manufacturers. They found that certification supports lower levels of continuous improvement performance in handling health and safety issues. Ma and Yuan (2009) investigated the status of safety climate of manufacturing enterprises in Chinese large enterprises and medium-sized enterprises. Results showed that perceived safety climate level is rather low in Chinese manufacturing enterprises. Hsu et al. (2008) proposed a hierarchical casual model describing relationships among organizational level factors, safety management factors, work group factors and individual safety performance in Taiwanese and Japanese oil refinery plants. Results showed that Taiwanese plants are characterized by higher level of management commitment to safety, harmonious interpersonal relationship, more emphasis on safety activities, higher devotion to supervision, and higher safety self-efficacy, as well as high quality of safety performance. While, Japanese plants showed higher level of employee empowerment and attitude towards continuous improvement, more emphasis on systematic safety management approach, efficient reporting system and teamwork, and high quality of safety performance. Gyekye (2005) examined the relationships between job satisfaction and workers' compliance with safety management policies and accident frequency. It was concluded that job satisfaction and safety climate are positively related. McDonald et al. (2000) explored the relationships of different aspects of safety culture and safety management systems in four aircraft maintenance organizations. Reason (1997) divided safety management into three different categories: the safety man-

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agement of a people, machine or equipment and organization. It was concluded that improvement of both quality and safety will result in a higher level of risk prevention, which creates the basis for an integrated management model. Simard and Alain (1995) developed a model combining micro and macroorganizational factors. Micro level factors refer to variables measuring work processes and hazards, workgroup cohesiveness and cooperation, supervisor's experience and approach to safety management, while macro-level factors consist of variables measuring top management commitment in occupational safety and socio-economic characteristics of firms. Results revealed that micro organizational factors are the primary determinants of the propensity of workgroups to take safety initiatives, with supervisory participative management of safety being the best predictor.

Recently, significant research attention have been directed to examine relationships between organizational factors and employee safety behavior (Flin et al., 2000; Neal et al., 2000; Oliver et al., 2002; Seo, 2005). Further, structural equation modeling (SEM) is a statistical methodology that takes a confirmatory approach to the analysis of a structural theory bearing on some phenomenon. It represents causal processes that generate observations on multiple variables. SEM conveys two important aspects of the procedure: (a) that the causal processes are presented by a series of regression equations and (b) that these structural relations can be modeled pictorially to enable a clearer conceptualization of the theory. The hypothesized model can then be tested statistically in a simultaneous analysis of the entire system of variables to determine the extent to which it is consistent with the data (Byrne, 2001).

This research, therefore, is directed toward exploring safety climate in Jordanian companies and aims to examine the relationships between four safety levels; organizational, management, group, and performance levels, from perception of employees using structural equation modeling (SEM). Further, this research compares safety culture between large- and medium-sized companies. The remaining of this research is organized as follows. Section two presents conceptual framework. Section three conducts data collection and analysis. Section four summarizes research results. Finally, conclusions are made in section five.

2. Conceptual framework

A range of factors has been identified as being important components of safety climate. These factors include: management values, management and organizational practices, communication, and employee involvement in workplace health and safety (Neal et al., 2000). Researchers (Seo, 2005; Clarke, 2006; Johnson, 2007; Turmberg and Daniell, 2008) measured safety climate using scales which covered: personal protective equipment, policies and practices, safety related condition, risk justification, communication, management support, safety training, and motivation safety knowledge. Hsu et al. (2010) stated that organizational factors, characterized as safety leadership perspective (management commitment, blame culture) and safety climate perspective (harmonious relationships), influence group-level safety management, which would in turn influence individual level safety awareness and practices. In this research, organizational factors will be divided into four levels, including organizational, safety management, work group, and safety performance level factors (Hsu et al., 2008). These levels are introduced in the following subsections.

2.1. Organizational level factors

This level includes five factors: management commitment to safety (MC), interrelationships (IRs), continual improvement (CI), blameless culture (BC), and employee empowerment (EE). MC is a major factor of safety climate (Zohar, 1980) and is considered critical to employee safety performance. MC denotes the extent to which top management demonstrates positive and supportive safety attitudes (Guldenmund, 2000). When top management is committed to safety, it provides enough support and resources to safety activities. High levels of commitment would influence safety behavior. IR is important in achieving organizational goal, as it facilitates organizational communication among coworkers and supervisors. Helmreich and Merritt (1998) found that Taiwanese pilots place high value on maintaining quality relationships with coworkers and supervisors. This finding implies that interpersonal relationship has cross-cultural implication.

Occupational Health and Safety standard requires the improvement processes on a continual basis (Boer et al., 2000). CI in safety can be defined as a planned, organized and systematic process of ongoing, incremental and company-wide change of existing safety practices aimed at improving organization performance and are enabled by an organizational infrastructure and a supportive culture (Oliver, 2009). Generally, blame culture (BC) refers to the tendency for management to punish employees when they make mistakes. Reason (1997) suggested that BC might discourage employees from reporting workplace safety problems and thus have a negative effect on employees' safety performance. To avoid blame or punishment from the management, employees may selectively decide what news to report, sharing the good news and hiding problems. In blameless safety climate, however, high performance employees are created in an empowered organization, and they will increase the organization's efficiency and productivity (Chang and Liu, 2008; Sigler and Pearson, 2000). EE is one of the key dimensions of safety climate (Dedobbeleer and Beland, 1991) that denotes to the extent to which employees maintain safety accountability through active participation in safety meetings and involvement in safety decision-making processes. EE increases employees' motivation to take safety responsibility (Geller, 1994) and reduce unsafe behaviors and team injuries (Hechanova-Alampay and Beehr, 2001).

2.2. Safety management level factors

The safety management level includes four factors (Lee and Harrison, 2000; Mearns et al., 1998; Williamson et al., 1997), including safety activities (SA), safety management system (SMS), reward system (RS), and safety reporting system (SRS). SA denotes the ways an organization communicates safety policies, acquires safety knowledge, and promotes safety practices. SMS includes safety policies formalization and safety procedure formulation, describes how safety problems are identified, investigated, assessed, controlled, and solved. RS is essential for effective safety management system. It denotes ways that top management reinforces employee safe behavior and corrects unsafe behavior, shapes employee safety performance (Geller, 2001), and encourages employees to report workplace safety problems (Reason, 1997). Zohar and Erev (2007) mentioned that the implementation of effective safety management system lies in providing frequent, personally meaningful, and immediate rewards for safe conduct. Further, Wu et al. (2008) stated that safety performance can be measured at individual level, which includes three factors: safety self efficacy, safety awareness, and safety behavior. Finally, information sharing is considered an important approach to increasing organizational efficiency and performance (Yang and Maxwell, 2011). SRS serves as an information sharing and organizational learning mechanism for incidents occurring in the workplace, proactively preventing future incidents (Reason, 1997). Griffin and Neal (2000) concluded that perceptions of knowledge about safety and motivation to perform safely influences individual reports of