Safety culture: Analysis of the causal relationships between its key dimensions

Beatriz Fernández-Muñiz*, José Manuel Montes-Peón [1], Camilo José Vázquez-Ordás [2]

University of Oviedo, Facultad de Ciencias Económicas y Empresariales, Departamento de Administración de Empresas y Contabilidad, Avda. del Cristo, s/n, 33071, Oviedo, Spain

Abstract

Introduction: Several fields are showing increasing interest in safety culture as a means of reducing accidents in the workplace. The literature shows that safety culture is a multidimensional concept. However, considerable confusion surrounds this concept, about which little consensus has been reached. *Method:* This study proposes a model for a positive safety culture and tests this on a sample of 455 Spanish companies, using the structural equation modeling statistical technique. *Results:* Results show the important role of managers in the promotion of employees' safe behavior, both directly, through their attitudes and behaviors, and indirectly, by developing a safety management system. *Impact on Industry:* This paper identifies the key dimensions of safety culture. In addition, a measurement scale for the safety management system is validated. This will assist organizations in defining areas where they need to progress if they wish to improve their safety. Also, we stress that managers need to be wholly committed to and personally involved in safety activities, thereby conveying the importance the firm attaches to these issues.
© 2007 National Safety Council and Elsevier Ltd. All rights reserved.

Keywords: Safety culture; Safety management system; Management commitment; Employees' Involvement; Structural equation modeling

1. Introduction

Over the past two decades, researchers and practitioners have shown increasing interest in the concept of safety culture because of its impact on safety outcomes such as injuries, fatalities, and other incidents (Choudhry, Fang, & Mohamed, 2006). Safety culture can be viewed as a component of the organizational culture that refers to the individuals, jobs, and organizational characteristics that affect employees' health and safety. The aim of a positive safety culture is to create an atmosphere in which employees are aware of the risks in their workplace, are continually on guard against them (Ostrom, Wilhelmsen, & Daplan, 1993), and avoid taking any unsafe actions. Thus, safety culture can be considered an important management tool helping to control workforce beliefs, attitudes, and behaviors with regard to safety (Beck & Woolfson, 1999).

Recognition of the importance of the safety culture in preventing occupational accidents has led to numerous attempts to define and assess it in many organizations (Arboleda, Morrow, Crum, & Shelley, 2003; Cooper, 2000; Cox & Cheyne, 2000; Glendon & Stanton, 2000; Guldenmund, 2000; Farrington-Darby, Pickup, & Wilson, 2005; Havold, 2005; Laurence, 2005; Lee & Harrison, 2000; Richter & Koch, 2004; Sorensen, 2002). But gaps still remain in the literature, and there is no universal agreement about the definition or content of the term. Previous studies have considered safety culture as a multidimensional concept, but

* Corresponding author. Tel.: +34 985106215; fax: +34 985103708.
E-mail addresses: beatrizf@uniovi.es (B. Fernández-Muñiz), jmmontes@uniovi.es (J.M. Montes-Peón), cvordas@uniovi.es (C.J. Vázquez-Ordás).
[1] Tel.: +34 985104975; fax: +34 985103708.
[2] Tel.: +34 9853704; fax: +34 985103708.

without a clear structure and without consensus on the specific dimensions. Empirical efforts trying to operationalize the safety culture concept have been scarce (Seo, Torabi, Blair, & Ellis, 2004). The literature has focused more on analyzing employees' perceptions, attitudes, and behaviors (Brown & Holmes, 1986; Cox & Cox, 1991; Coyle, Sleeman, & Adams, 1995; Dedobbeleer & Beland, 1991; Diaz & Cabrera, 1997; Melià & Sesé, 1999; Niskanen, 1994; Seo et al., 2004; Silva, Lima, & Baptista, 2004; Williamson, Feyer, Cairns, & Biancotti, 1997; Zohar, 1980). Researchers have conceded rather less importance to measuring the situational characteristics of the safety management system, which Cooper (2000) and Mearns, Whitaker, and Flin (2003) consider to be an integral part of the organization's safety culture. In an attempt to address these gaps in the literature, the current study aims to provide an integrative definition of the safety culture concept, identify its main indicators, and analyze the possible relations between them, proposing a model of positive safety culture. With this purpose, we carry out an exhaustive review of the previous studies of safety management and safety culture, which will provide the basis for the formulation of the hypotheses. Subsequently, we develop measurement scales of the concepts used in the proposed model, in order to operationalize them, and carry out an empirical study on a sample of 455 Spanish firms to validate the scales and test the hypotheses. This process involves the use of the structural equation modeling statistical technique.

1.1. Structuring the concept of safety culture

Several meanings have been attributed to the term safety culture, giving rise to numerous definitions (e.g., CBI, 1990; Cooper, 2000; Cox & Cox, 1991; HSC, 1993; IAEA, 1986; Pidgeon, 1991; Wallace & Neal, 2000; Wiegmann, Zhang, Von Thaden, Sharma, & Mitchell, 2002). Nevertheless, most of these are very broad and implicit (Guldenmund, 2000), and no unanimously accepted definition exists. Despite this, it is possible to identify various common aspects allowing us to propose the following definition of a positive safety culture: "A set of values, perceptions, attitudes and patterns of behavior with regard to safety shared by members of the organization; as well as a set of policies, practices and procedures relating to the reduction of employees' exposure to occupational risks, implemented at every level of the organization, and reflecting a high level of concern and commitment to the prevention of accidents and illnesses." Researchers have carried out empirical studies to determine the content of safety culture (e.g., Berends, 1996; Geller, 1994; Lee, 1996; Mearns et al., 2003; Ostrom et al., 1993; Safety Research Unit, 1993). Other work has reviewed these studies in an attempt to identify similar elements, but several inconsistencies are apparent, and the authors' idiosyncratic labeling of safety culture indicators often makes it extremely difficult to reconcile them (Seo et al., 2004; Wiegmann et al., 2002). Despite this, two factors — employees' involvement

and management commitment to safety — have been properly replicated across studies (Cox & Cheyne, 2000; Dedobbeleer & Beland, 1991; Hofmann & Stetzer, 1996; Mearns et al., 2003).

Cooper (2000) offered an integrative framework to analyze this construct, using Bandura's (1986) model of reciprocal determinism. Cooper considers that the attitudes, perceptions and beliefs of individuals, their behaviors, and the safety management systems (objective situational features) are elements that combine to form the organization's safety culture. In this way, the previous literature review helps identify three key indicators of the organization's safety culture: managers' commitment to safety, employees' involvement, and the policies and procedures that form the safety management system. Likewise, the dependence relations between these three dimensions constitute the hypotheses of the study.

1.2. Proposed Model of Safety Culture: Hypotheses

Previous research has shown that management commitment to safety is a determining factor of employees' attitudes and behaviors with respect to risk (e.g., Cheyne, Cox, Oliver, & Tomás, 1998; Cohen, 1977; Dedobbeleer & Beland, 1991; DeJoy, Schaffer, Wilson, Vandenberg, & Butts, 2004; Donald & Canter, 1994; Eiff, 1999; Hofmann & Stetzer, 1996; Ostrom et al., 1993; O'Toole, 2002; Rundmo, 1996; Rundmo & Hale, 2003; Seo et al., 2004; Simonds & Shafari-Sahrai, 1977; Smith, Cohen, Cohen, & Cleveland, 1978; Vecchio-Sadus & Griffiths, 2004; Zohar, 1980). A committed manager who is personally involved in safety activities and who takes an interest in working conditions, conveys to the employees a sense of the importance of safety for the organization. As a result, the employees comply with regulations, take the proper safety measures, and participate actively in meetings and activities designed to promote improvements in their workplace. Likewise, the management policies, programs, and practices that form the safety management system are regarded in several studies as a precursor of the employees' perceptions about the importance of safety in their organization (DeJoy et al., 2004; Hofmann, Jacobs, & Landy, 1995), and so contribute to performing tasks in a safe manner (Cohen, 1977; DeJoy et al., 2004; Diaz & Cabrera, 1997; Hofmann et al., 1995). However, the implementation of the safety management system in the general management of the firm requires the support of managers, who should allocate financial resources to the activities that make up such a system and should be personally involved in them, showing a positive attitude and total commitment and interest in the issue (Civil Aviation Safety Authority, 2002; Zohar, 1980). Finally, the safety management system will have a positive and direct effect on the firm's accident rates (Petersen, 2000). Thus, this system will reduce workers' injuries and illnesses, as well as material damage. Consequently, it will reduce lost time caused by interruptions in the productive process, cut labor