



## Safety compliance on offshore platforms: A multi-sample survey on the role of perceived leadership involvement and work climate

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### ARTICLE INFO

#### Article history:

Received 8 December 2011

Received in revised form 2 July 2012

Accepted 5 November 2012

Available online 20 December 2012

#### Keywords:

Leadership involvement

Work climate

Safety compliance

Safety behavior

Offshore platforms

### ABSTRACT

Accident analyses and investigations regularly identify a lack of compliance with rules and procedures as a central contributing factor to workplace accidents. This underlines the importance of identifying the organizational factors that affect the level of safety compliant behavior. The purpose of the present study was to examine how workers' perception of leadership involvement in daily work operations affects the level of safety compliant behavior among workers employed on offshore platforms operating on the Norwegian Continental Shelf. The effect that leadership involvement exerts on safety compliance was measured both directly and indirectly through the intervening variable work climate. Using survey data from six different measure periods ( $N = 10003$ ), exploratory and confirmatory factor analysis identified three dimensions of work climate; (1) workers' competence and involvement, (2) role clarity and (3) follow-up of contractors. The following SEM analyses revealed that leadership involvement in daily work operations has a significant positive influence on the level of safety compliance on offshore platforms. The effect of leadership involvement was found to be both direct and indirect, mediated by the three work climate dimensions selected for this study. Theoretical and managerial implications of the findings are discussed.

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### 1. Introduction

Since the first exploration well was drilled on the Norwegian Continental Shelf (NCS) in 1966, both the authorities and the oil and gas industry have been repeatedly reminded of the high risks involved in offshore petroleum activity. After more than 40 years of production, occupational and major accidents on the shelf have caused the death of 268 offshore workers (Petroleum Safety Authority Norway [PSA], 2011c). The risk level has gradually reduced in the industry over the last years (Kongsvik et al., 2012), but accidents still happen and there is a continuous need for improvement.

Although the standard of the technical equipment on the offshore installations is definitely a critical aspect of safety and accident causation, it is also recognized that the safety level within such complex work systems is highly dependent on human behavior (Adie et al., 2005; Gordon et al., 1996; Johnson, 2007). Hence, the oil and gas industry is now increasing its efforts in developing human risk management systems which aim at enhancing safety behavior (Didla et al., 2009). According to Neal et al. (2000, p. 101), safety behavior consists of two different behavioral dimen-

sions: safety participation and safety compliance. Whereas safety participation refers to voluntary work which aims at supporting and promoting safety in the organization, safety compliance “involves adhering to safety procedures and carrying out work in a safe manner”. Human risk management systems within the offshore oil and gas industry pay considerable attention to safety compliance. This is due to the fact that virtually all work operations within this industry are regulated by rules and procedures, and because investigations of offshore accidents repeatedly identify lack of compliance with the regulations as a central contributing factor (e.g., PSA, 2005, 2007, 2011b). This finding is, however, not restricted to offshore accidents, but is a recurring conclusion in accident investigations in general (Hopkins, 2011).

The well-recognized importance of safety compliance as a barrier against workplace accidents has sparked off a considerable amount of research with the aim of identifying the antecedents of non-compliant behavior (e.g., Krause et al., 1999; Lu and Yang, 2010; Matilla et al., 1994; Mearns et al., 2010; Neal et al., 2000; Zohar, 2002; Zohar and Luria, 2003). A common research topic within these studies is that of leadership. Two relatively different, but still complementary perspectives can be identified in leadership studies (Hofmann and Morgeson, 2004). One of them links safety compliance to the safety-specific dimensions of leadership such as monitoring, correction, and reward for safe behavior (e.g. Kapp, 2012; Zohar, 2002). The other focuses more on the general dimensions of leadership

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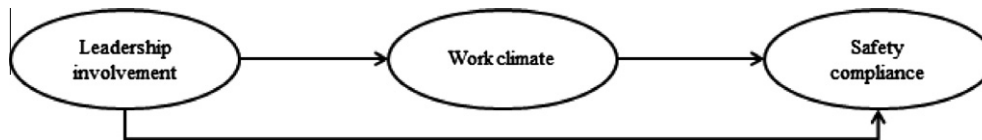


Fig. 1. The principal research model of the present study.

behavior, such as trust, cooperation, and involvement, and how such dimensions are related to safety compliance (e.g. Matilla et al., 1994; O’Dea and Flin, 2001). The vast majority of the leadership studies apply a safety-specific perspective, while considerably less research is undertaken from a more general leadership perspective (Matilla et al., 1994). However, according to Hofmann and Morgeson (2004, p. 170), “it is important, when either reviewing or investigating the relationship between leadership and safety, to move beyond the safety-specific literature to consider the broader leadership literature. This is important because it may yield additional insight into how leadership can impact safety.” The present study seeks to explore this relatively untapped area of leadership research. The focus is on leadership’s involvement in work operations, which is understood as workers’ perceptions of the degree to which leaders participate in the planning and preparation of work, follow up the execution of the work, and contribute to good cooperation among team members, and the significance of such involvement for safety compliance.

In addition to examining the direct relationship between leadership involvement and workers’ safety compliance, the present study aims to explicate this relationship by examining the role such involvement plays in establishing a work climate that is favorable to safety compliance. A number of studies have linked safety compliance to both leadership and work climate characteristics such as workers’ perceptions of communication, roles, and influence (e.g., DeJoy et al., 2004; Larsson et al., 2008; Matilla et al., 1994), but little research has been done to examine the relationship between these variables (Thompson et al., 1998). The question that is addressed in the present study is therefore how leadership involvement in work operations on offshore platforms directly influences safety compliance, and also how it influences safety compliance indirectly through the work climate. The principal research model is presented in Fig. 1, but it will be further extended by hypotheses which are considered in the following sections of this paper.

This study is based on a multi-sample survey of employees working for a Norwegian oil company on 28 different offshore installations on the NCS. The survey aimed to map the offshore workers’ perceptions of their leaders’ behavior, the perceived climate of their work group, and the level of safety compliance. The survey was administered six times in the same study population. The advantage of such a study design is that it allows for repeated testing of both the factorial structure and the hypothesized relationships, thus increasing the validity of the study.

### 1.1. Theoretical background and research hypotheses

Studies which stress the safety-specific dimensions of leadership all indicate that leaders who emphasize, discuss, reward, monitor, and encourage safe performance generate safer performance within their work group (Hofmann and Morgeson, 2004). Within these studies the safety-specific variants of Bass’s (1985) concepts of transactional and transformational leadership styles have stimulated great research interest. Safety-specific transactional leadership is characterized by the establishment of appropriate safety goals, by monitoring workers’ performance in relation to those goals, and by rewarding or correcting behavior which sustains or improves safety performance (Kapp, 2012; Zohar, 2002). Safety-specific transformational leadership is characterized by

leaders who challenge workers to achieve exceptional safety standards, who display concern for the safety and well-being of employees, who challenge the workers to develop improved practices for solving safety-related problems, and who stand out as role models for their staff by working in a safe way themselves (Kapp, 2012; Mullen and Kelloway, 2009).

Both safety-specific transactional and safety-specific transformational leadership styles have been proven to be positively related to workers’ safety compliance (Kapp, 2012; Krause et al., 1999; Mullen and Kelloway, 2009; Zohar, 2002; Zohar and Luria, 2003). Studies of offshore platforms also indicate that this is the case in these high risk settings. Mearns and Reader’s (2008) study of UK offshore workers is an example of this. In their study they found support for a positive relationship between supervisors’ concern for the safety and well-being of employees, and the level of safety behavior of the employees. Further, Bryden’s (2002) analysis of a safety behavior program, implemented in an operator company on the UK continental shelf, demonstrated that safety specific transformational leadership is a key element in enhancing safety compliance. Consistent with these findings, Zohar (2002, 2010) recommended that studies of leadership and safety should choose a safety-specific leadership perspective as opposed to a general leadership perspective. Zohar’s argument is that safety often conflicts with other aspects of performance and that safe behavior under such conditions will only emerge if safety is given high priority relative to these.

Zohar’s argument is plausible, but studies that have investigated the relationship between a broader set of leader actions and safety compliance suggest that good safety management extends beyond the clearly safety-specific characteristics of leadership. Matilla et al.’s (1994) study of safety compliance within the building construction industry is an example of this. The results of their study indicated that supervisors who give feedback on performance, monitor performance, spend time communicating with workers about non-work related topics, and display a participatory style of leadership are the most effective supervisors with respect to both safety compliance and financial performance.

In line with these findings, O’Dea and Flin (2001) argue, in a study of leadership in the offshore oil and gas industry, that good safety leadership is not restricted exclusively to the safety-specific dimensions of leadership. The qualities of good safety leadership which they emphasize can be subsumed under the term “participative management.” In addition to high involvement in safety initiatives, a critical activity in participative management is leadership involvement in work operations and frequent communication between workers and leaders (O’Dea and Flin, 2001). Empirical support for this view can be found in an early review of research into successful occupational safety programs, conducted by Cohen (1977). Cohen’s study revealed that frequent interaction and daily contact between supervisors and line workers has a positive effect on safety improvement efforts. In a follow-up study which evaluated and compared low versus high accident companies, similar conclusions were drawn (Smith et al., 1978): leaders in companies with low accident rates were more actively involved in supervising, planning, and monitoring the work processes in general; that is to say, they spent more time at the front end of the work operations. A recent study by Yagil and Luria (2010) of 11 manufacturing organizations gives support to Cohen

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