Safety Science 47 (2009) 1324–1331

Contents lists available at ScienceDirect

Safety Science

journal homepage: www.elsevier.com/locate/ssci

What is most important for safety climate: The company belonging or the local working environment? – A study from the Norwegian offshore industry

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ARTICLE INFO

Article history:
Received 18 November 2008
Received in revised form 2 April 2009
Accepted 2 April 2009

Keywords:
Safety climate
HSE
Offshore
Petroleum industry
Working environment

ABSTRACT

Obtaining knowledge about factors affecting health, safety and environment (HSE) is of major interest to the petroleum industry, but there is currently a severe shortage of relevant studies. The aim of this study was to examine the relative influence of offshore installation (local working environment) and company belonging on employees' opinions concerning occupational health and safety. We analyzed data from a safety climate survey answered by 4479 Norwegian offshore petroleum employees in 2005 on the dimensions "Safety prioritisation", "Safety management and involvement", "Safety versus production", "Individual motivation", "System comprehension" and "Competence" using one way analysis of variance (ANOVA), effect size and mixed model. The companies differed significantly for "Safety prioritisation", "Safety versus production", "Individual motivation", "System comprehension" and "Competence". The local offshore installation explained more of the safety climate than the company they were employed in or worked for did.

1. Introduction

1.1. Health and safety in the petroleum industry

Health, safety and environment (HSE) has been an important issue in the Norwegian petroleum industry since the offshore oil and gas drilling and production started in Norway in 1969, as it has been in other countries with this kind of production (Gardner, 2003). Today more than 50 oil and gas fields are being operated on the Norwegian continental shelf, and petroleum-based activities employed approximately 80,000 people in 2005 (Ministry of Petroleum and Energy, 2005). In 2004 approximately 20,000 people had their workplace offshore (Mæhlum and Kjuus, 2006). The oil installations related to these operations on the Norwegian continental shelf came to be located at between 40 and 185 miles from the coast, creating workplaces in new and potentially dangerous working environments.

In the seventies and eighties a major focus was put on the safety part of the HSE work at the offshore installations. Work at offshore installations involves risks related to fires and explosions, as oil production involves several flammable substances. The location makes such events even more dangerous than onshore, because of the long distances to medical aid and hospitals. Health, safety and environment were at this time considered separate issues. While safety issues seemed to be most widely emphasized, environmental factors became more important for the industry parallel with the growing public opinion regarding sustainable development, and in the face of several industry-related pollution disasters. In the 1980s and 1990s systematic work on issues related to health and working environment in the petroleum industry became strengthened, partly due to the Working Environment Act in Norway coming into force on the Norwegian continental shelf from 1979, regulating both the physical and the psychosocial working environment. The three concepts "health", "safety" and "environment" became more integrated in the petroleum industry during the 1990s.

The offshore working environment has been described as stressful, with psychosocial stressors such as difficult working and living conditions (Parkes, 1998; Gardner, 2003; Mearns et al., 2003), long working days and shift work including night work (Lauridsen and Tonnesen, 1990; Parkes, 1999, 2003) as well as physical stressors like noise (Morken et al., 2005), ergonomics (Chen et al., 2005) and chemical hazards (Steinsvag et al., 2007). All these factors may affect health, environment and safety in a negative manner.

The risk of major offshore accidents increased in the late 1990s (Ministry of Government Administration and Reform, 2002).

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doi:10.1016/j.ssci.2009.04.001

Several actions were undertaken in the industry in order to reverse this development, and HSE-related work was assigned a higher priority. In this situation the need for evaluating the ongoing HSE work arose among the petroleum companies. The Petroleum Safety Authorities Norway (PSA) initiated the project "Trends in Risk Levels on the Norwegian Shelf" in 1999/2000 to measure the impact of HSE-related work in the industry, and subsequently to contribute to identifying areas that are critical for working environment and safety and to increase insight into potential causes of accidents and undesirable conditions offshore (Petroleum Safety Authority Norway, 2006). Data from this project are used in the present study.

1.2. Organizational belonging and health and safety climate

The terms "safety culture" and "safety climate" have often been used interchangeably, although safety culture is considered to be of a more complex and enduring phenomenon than safety climate, reflecting fundamental values, norms, assumptions and expectations (Mearns and Flin, 1999) which is, to some extent, presumably linked to national and societal culture. Several studies have found safety management, colleague involvement and collaboration to be important dimensions for safety climate (e.g. Flin et al., 2000; Rundmo and Hale, 2003; Guldenmund, 2007). Other important dimensions are safety system, risk, work pressure, competence and procedures/rules (Flin et al., 2000). However, Cooper and Phillips (2004) indicate that "the climate–behavior–accident path is not as clear cut as commonly assumed" and that differences in underlying key structures may reflect methodological differences in question generations, sample populations across industries, labelling of constructs according to the theoretical model driving the research or that different instruments measure distinctly different safety climate concepts. On the other hand, safety climate measures seem to be useful to ascertain employees' perceptions of the way in which safety is being operationalized – despite differences in how safety climate is conceptualized (Cooper and Phillips, 2004; Guldenmund, 2007; Clarke, 2006).

One approach to study variations in HSE-related outcomes in the petroleum industry has been safety climate surveys describing employees' perceptions of the priority an organization places on issues concerning safety (Zohar and Luria, 2005). The safety climate is most often measured by self-administered questionnaires. Mearns et al. (1998) proposed that questionnaire-based surveys measuring safety climate are capable of sensing transient surface features discerned from the workers attitude to safety at a given point of time – a snapshot of the prevailing safety culture.

Mearns et al. (2003) indicates that organizations performing well in safety climate surveys in the offshore petroleum industry in UK have fewer accidents. Similarly, a study based on a survey in a large Norwegian oil and gas company stated that there was a connection between employees' opinions of management and safety results, especially regarding accidents (Høivik et al., 2007).

The importance of the local work environment has been studied in the petroleum industry as well as in other industries. Mearns and Reader (2008) suggest that improving safety performance may be better delivered indirectly through other sources than directly through safety inventions such as company indication of safety commitments and safety messages. For example studies from the UK offshore industry have found that manager's positive attitude against its workforce (Shannon et al., 1997), managements concern about their workforce and e.g. health promotion activities and education at the workplace seems to be effective for safety performance (Mearns and Hope, 2005). Employee perceptions of management commitment, social support and subjective evaluations of priorities of safety versus production goals, seem to be important predictor variables for employee satisfaction with safety measures (Rundmo, 1994). Two studies suggest that the local working environment at the offshore installation is important for the safety climate but neither considered whether this is related to the company the workers are employed by. One of these studies has compared results from the workers' perception of social and working environment factors in Norway and the United Kingdom (Mearns et al., 2004). The other study (Tharaldsen et al., 2008) examined the importance of the localization on the platform compared to work areas such as drilling or catering, company type like operating and contractor companies and installation type, such as drilling or production. Offshore petroleum employees in Norway are employed in an operating company or in a contractor firm. In 2005 contractors carried out 63.6% of the reported work hours on the Norwegian Continental shelf (Petroleum Safety Authority Norway, 2006).

However, in the petroleum industry there is a lack of knowledge concerning to which extent organizational belonging matters, compared to the platform location. Such information is of major interest in the practical work on HSE in the petroleum industry. What is most important: the organizational belonging or the local work place?

1.3. Aim of the study

The aim of this study was to examine the health and safety climate in the petroleum industry in relation to the company belonging and the local offshore installation. The findings will be of importance to future planning of the HSE-related work in the petroleum industry.

2. Materials and methods

Data from the Petroleum Safety Authorities project "Trends in Risk Levels" carried out in 2005 was used for this study. The questionnaire was called "the Norwegian Offshore Risk and Safety Climate Inventory (NORSCI)" and has previously been conducted in 2001 and 2003. The aim of the survey was to measure health and safety climate and risk for occupational health and accidents on Norwegian offshore petroleum installations. The NORSCI questionnaire was developed by health and safety researchers, and used experts from occupational health and safety in the industry and representatives from the unions to review, test and examine it (Tharaldsen et al., 2008; Petroleum Safety Authority Norway, 2006). The questionnaire was limited to factors of relevance to safety and working environment, excluding external environment. It has been described in more detail elsewhere (Tharaldsen et al., 2008).

2.1. Sample and data collection

All who attended different installations offshore in Norway during a period from December 2005 to February 2006 were invited to participate in the survey (NORSCI). This included workers on all production and mobile units on the Norwegian Continental Shelf and workers on vessels inside the safety zone around the installations. The respondents received the questionnaire through the companies' own routines at their workplaces or at the heliports wherefrom employees are being shuttled to Norwegian offshore installations. All employees were encouraged to participate and either to hand the questionnaire back to a nurse offshore in a closed envelope or to return it by mail to the researchers responsible in Stavanger. Here the answers from NORSCI were put in a database. The participants did not write their name or birth date on the form.