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Understanding Safety Culture in the Oil Company: A Case Study from the Czech Republic

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A strong safety culture drives resilience and accident prevention, while a safety climate reflects employees’ perceptions of safety practices. This study evaluated the safety culture and climate in a Czech oil company, combining document analysis, interviews, site visits, the NOSACQ-50 questionnaire, and "Hearts and Minds" workshops. Key strengths included robust HSE governance and management support, while challenges involved overly complex documentation, limited employee participation, and insufficient recognition of safe behaviour. Recommendations focus on simplifying rules, enhancing involvement, and rewarding safety. The findings highlight the value of comprehensive assessments to strengthen safety culture in high-hazard industries.

# Introduction

High-hazard industries, such as the petroleum and oil sector, face unique challenges in managing risks that can lead to major accidents and occupational injuries (Swuste et al., 2020). Although the frequency of major accidents is decreasing, the potential to cause serious consequences associated with hazardous material spills, explosions or fires remains a concern (Wood, 2019). The potential consequences of these incidents, ranging from environmental disasters (Deepwater Horizon, 2010) to human (Piper Alpha, 1988; BP Texas City, 2005) and financial losses, underscore the critical importance of effective strategies for more comprehensive prevention. These serious accidents occurred in companies that had safety management systems in place, and yet these systems failed. Therefore, the focal point becomes efforts to implement robust integrated safety management systems that are designed to systematically identify, analyse, evaluate, and control risks in both health, safety and environment (HSE) and process safety. However, the successful implementation of these systems depends not only on technological and process solutions but also on the human factor, especially the quality of the safety culture in the organization (Swuste et al., 2021). Therefore, safety culture plays a key role within HSE management. A solidly implemented HSE management system is the essential basis for good HSE performance. However, outstanding performance and continuous improvement will only be achieved when there is a culture in which the elements of the HSE management system can flourish (Hudson, 2007).

History of the “safety culture” term started in 1986 when the International Atomic Energy Agency (IAEA) investigated the Chernobyl accident and identified poor safety culture as the main cause of the accident. From this time many definitions of safety culture were presented, and much research was conducted but there are still a lot of questions and “safety clouds” (Guillaume et al., 2018).

The definition published by ACSNI understands an organization's safety culture as the result of individual and group values, attitudes, perceptions, competencies, and patterns of behaviour that determine the commitment to and the style and proficiency of organization's health and safety management. Organizations with a positive safety culture are characterised by communications founded on mutual trust, by shared perceptions of the importance of safety, and by confidence in the efficacy of preventive measures (Guldenmund, 2010).

Safety culture may improve safety performance since it is connected with reduced total injury rate (Bautista-Bernal et al., 2024). However, as noted by Hudson (2007), Kim (2016) and Swuste (2021), although a strong safety culture is essential for proactive safety management and accident prevention, its direct impact on reducing the number of major accidents is difficult to quantify. This assumption is based on an analysis of historical major accidents, where weak safety cultures have often been associated with systemic failures. But this can lead to safety culture being taken as a catch-all explanation for safety failures that cannot be explained in any other way (Guldenmund, 2010).

Safety culture is multifaced and has different aspects (Cooper Ph.D., 2000; Vierendeels et al., 2018). Health and Safety Executive (HSE, 2005), based on Cooper (2000), defined three aspects of safety culture: situation (what company has – safety management system), psychological (how people feel – safety climate), and behavioural (what people do). For this reason, it is important to use more methods and approaches when safety culture is evaluated (Eeckelaert et al., 2011; van Nunen et al., 2022).

To better understand and enhance safety culture, organizations can utilize safety climate as a practical and measurable indicator of how safety is perceived and prioritized by employees. The safety climate evaluates the psychological aspect of the safety culture in the company (HSE, 2005). When interpreting the results of the safety climate assessment in relation to safety culture, important facts must be considered. First, the safety climate is only a surface and immediate reflection of the safety culture, and can be influenced relatively easily by current events, such as recent incidents or management changes. On the other hand, the safety culture is deeply rooted in the underlying assumptions and values, making its influence a long-term process that requires consistent effort and reinforcement (Guldenmund, 2007).

The purpose of our research was to conduct a case study of the safety culture in one Czech oil company with a well-established HSE management system in order to highlight strengths, identify opportunities for improvement, and suggest concrete steps to strengthen the safety culture. As a high-risk industry, the oil sector requires rigorous assessment methods to improve safety practices and minimize the risks associated with operations.

The situational aspect was evaluated by document analysis and interviews with HSE experts, the NOSACQ-50 was chosen to assess the psychological aspect, and interviews with employees and workplace observation provided a partial picture of the behavioural aspect. To better understand the context in the company, a workshop 'Understanding your HSE culture' was held using the Hearts and Minds methodology.

Integration of qualitative and quantitative data provided a nuanced understanding of the issue and offered practical lessons not only for the oil industry but also for other high-risk industries. Thus, the results of this case study can serve as a valuable example for other companies looking to improve their safety culture, and thus their overall HSE performance.

* 1. Case Study Context
     1. Situation in the Czech Republic

Although research on safety culture began almost 40 years ago and it seems that this topic is already somewhat outdated in the academic world, the situation in practice, especially in the Czech Republic, is different. As far as the authors are aware, only 2 studies on safety culture among companies have been carried out in the Czech Republic in the context of the SEVESO III Directive. The first survey was carried out in 2021 when 158 operators of Seveso III compliant undertakings were asked to participate in the survey and 55 of them completed the questionnaires, with a return rate of 35% (Berger & Slováčková, 2022). A second survey was carried out in 2024, which differed partially from the first one. In this survey, 117 operators were approached, and 54 responses were received, this average response rate was 46%. Although the questionnaires were not identical, the results showed basic trends and that even after 3 years there are still areas where businesses are struggling.

The first survey showed that 90% of companies under international management had implemented activities to promote a safety culture, while only about 60% of Czech companies had done so. The number of activities that enterprises introduce is significantly influenced by foreign parent companies, with these companies carrying out an average of 5 activities, while firms without this influence carry out an average of only 1.4 activities (Berger & Slováčková, 2022).

The results showed that companies struggle to assess the safety culture. Very often, they use inappropriate methods that focus only on certain aspects of safety culture such as audit results or only on lagging indicators such as the number of accidents. On the other hand, companies declared the need for available information, guidelines, and sharing of good practices, which shows that they are interested in pursuing this area (Berger & Slováčková, 2022).

* + 1. Company information

The company in which the case study took place has some specifics that influenced the chosen methods of safety culture assessment. It is a joint stock company and a registered fuel distributor with nationwide operations and 880 employees. It operates a total of 17 oil product warehouses throughout the country. Approximately 540 employees work in the operations department. Between 18 and 55 employees work in the non-automated petroleum product warehouses. Its main activities include: the transport, storage, and sale of petroleum products (wholesale of fuel, logistics services in the field of petroleum products, automobile transport of fuel, and protection of state material reserves). The organizational structure consists of the Company's Board of Directors, General Manager's Department, Commercial Department, Financial Department, and Operations Department.

As a large part of the operation takes place on small sites, petroleum product storage facilities, where a limited number of employees work, great demands are placed on education and professional competence, and at the same time, it is necessary to adapt the use of some safety management system tools.

* 1. Methods

Various methods were employed to assess the company's safety culture. Internal HSE management system documentation was analysed to understand its structure and implementation. Interviews with safety experts were conducted to identify gaps between policy and practice. Site visits were carried out at two locations, during which random staff interviews were conducted to gather on-the-ground insights. The safety climate was evaluated using the NOSACQ-50 questionnaire, complemented by two workshops based on the Hearts and Minds methodology. This multifaceted approach provided a comprehensive overview of the company's HSE situation.

* + 1. Qualitative Research Methods

The internal HSE documents were assessed for content accuracy, concreteness, and comprehensibility. Additionally, the links between documents were checked, including to look for inconsistencies. The documents provided insight into the safety management system set-up, which was assessed with respect to characteristics of a strong safety culture: safety leadership, communication, employee involvement, clearly defined safety responsibilities, and safety based on learning (Slovackova, 2024, HSE, 2005).

The interview with HSE experts was conducted after the analysis of the submitted documents. The interview took place at one of the sites, with 3 evaluators and 4 company HSE specialists. The interview was recorded so that it was possible to go back and evaluate all the details. The interview was conducted using pre-prepared open-ended questions and was structured into 7 key areas: Vision and goals, Leadership and involvement, Organization, Learning from incidents, Risk assessment, Training and competencies, Audits and inspections.

Furthermore, during the interview, the questions that emerged from the study of the documentation were refined, and the consistency between the regulations and the real situation was established.

Two site visits were also made at the company's locations. Both were aimed at observing the situation at the site, the behaviour of employees, and the application of technical and organizational measures. During the visits, several short interviews were conducted with randomly selected employees to find out how they perceived safety measures and obstacles and risks in the workplace. The questions also focused on safety communication and opportunities for their participation. The consistency between how the system is set up and how it is perceived and actually implemented in daily practice was also sought.

* + 1. Quantitative research - Safety Climate Assessment

The safety climate assessment was carried out by NOSACQ-50 (Kines et al., 2011). A small modification of the original questionnaire was made to assess management commitment and the perception of management and employees themselves.

The original NOSACQ-50 questionnaire contains 50 questions – the same for leaders and employees. Questions are spread into 7 dimensions (1. Management safety priority, commitment, and competence; 2. Management safety empowerment; 3. Management safety justice; 4. Workers’ safety commitment; 5. Worker safety priority and risk non-acceptance; 6. Safety communication, learning and trust in coworker safety competence; 7. Trust in the efficacy of safety systems). (Kines et al., 2011)

The first 3 dimensions (Questions 1 – 22) focus on the commitment of the management to safety. The modified questionnaire for leaders contents has only 22 questions from dimensions 1- 3. The questions were changed to 'we' statements.

Example - Question 1

Employee version: *Management encourages employees here to work in accordance with safety rules - even when the work schedule is tight.*

Leader version: *We, as leaders (senior managers), encourage employees to work according to safety rules, even when the work schedule is tight.*

The questionnaires were distributed in the company on paper and the response was voluntary and strictly anonymous.

The completed questionnaires were sent to the research team for evaluation. Data were submitted into Excel spreadsheet NOSACQ-50 data entry form 2022 and a back-end evaluation was performed. (The Nordic Occupational Safety Climate Questionnaire- NOSACQ-50 database, *n.d.*). Later, the preliminary results will be sent to the National Research Centre for the Working Environment (NFP) where detailed statistics will be carried out using IBM SPSS software and a comparison with data from the international database will also be made.

NOSACQ-50 uses a 4-level Likert scale, and it gives the possibility to receive basic information from many employees. But the identifying specific problems can be limited.

* + 1. Semi-quantitative research: Workshop “Understanding your HSE culture”

This workshop is part of the Hearts and Minds toolkit (The Energy Institute) originally developed for the Shell company. It is widely used for different industries. Two workshops were conducted in the Company. The first was focused on the workforce and 18 employees participated. The participants of the second workshop were 19 middle management members.

The Company purchased the original brochure “Understanding your HSE culture” and the research team translated it into Czech Language and carried out the workshop according to the recommendations and guidelines of Hearts and Minds methodology. Results from workshops highlighted the strong points and involved participants in a discussion about the areas where the improvements are the most important. The participants worked in groups, and they were stimulated to propose solutions for them.

All the information obtained in this way was analysed and compared with each other to create a comprehensive picture of the safety situation.

* 1. Results and discussion
     1. Robust HSE management system

The analysis of the documentation showed that the company has a robust system in place based on legislative requirements, both in the field of occupational health and safety (OSH) and prevention of major accidents (SEVESO III Directive).

Preliminary results show that the system is well developed, enables compliance with regulatory requirements, and provides a solid basis for further efforts to improve safety. The role of the HSE department is perceived quite positively, as it is the main driver for creating, changing and maintaining the whole system. The HSE management system is based on risk management, which is considered a central tool. This approach allows tools and measures to be interlinked.

On the other hand, robust documentation and an emphasis on detailed procedures can lead to the system and individual documents becoming overly extensive, complicated, cumbersome and difficult to understand. This was evident in the safety climate assessment, where the results for dimension 7: “Workers' trust in the efficacy of safety systems,” were rather average, whereas dimension 7 is rated highest in the international database. Comments on the excessive detail of the procedures were also made during the discussion at the Hearts and Minds workshops.

This result aligns with what Guldenmund (2010) describes when he argues that creating an effective safety management system is the opposite of a bureaucratic paperwork and regulations approach.

* + 1. Weak points – the same result from the management, supervisors and workforce

The Hearts and Minds workshops, safety climate assessment, interviews, and documentation review all identified a common area for improvement: low employee empowerment. This included limited opportunities for employees to influence safety decisions and a lack of reward and recognition for safe behaviour.

The HSE management system in the company has been prepared mostly one way. There is a visible strong push from management to improve safety, but so far without any real involvement from the rank and file and lower levels of management. The company has very good unionization, but it is not sufficient. There is no activity in the company to encourage bottom-up communication and enable greater employee involvement. There are no leading indicators - appropriate safety-focused targets that employees themselves would meet - for example, inspection results, risk alerts, and involvement in some projects. Employees have limited opportunity to influence some decisions that affect their work and also affect their safety.

This was reflected in the NOSACQ-50 safety climate assessment, where the results for Dimension 2: “Management safety empowerment” were not at all worse and there was also the largest difference between management and employee responses. Question 16: “*Management involves employees in decisions regarding safety”* had the worst ratings from employees.

This fact was also indirectly reflected during the discussions at the Hearts and Minds workshops. Where for both workshops, the weakest results were in Supplier selection and HSE communication at meetings. The selection of contractors has a major impact on the safety of work on individual sites, but there is no opportunity to comment on the selection, for example, based on past experience. At HSE meetings it became apparent that very often safety information is conveyed only in a passive way.

Another opportunity for improvement that emerged from both Heart and Minds workshops is in the area of recognition and rewards. Employees agreed that good work and compliance are taken for granted and there is no company practice of rewarding good work. There is a lack of tools in the management system to support reward and recognition. There are no proactive targets set to enable and encourage employee activity and provide opportunities for recognition. Achievements are not celebrated. At the same time, managers are not educated on how to encourage and reward employees. This in turn is reflected in less employee motivation and indirectly in low scores in Dim 2 Management Empowerment.

* + 1. What can be learnt from well-evaluated areas

One component of the system that was very well evaluated in both Hearts and Minds workshops is the near- miss and incident reporting system. A simple incident reporting system, educational activities and also regularly rewarding the best reports may be one of the reasons why this is the case. The effort put into explaining the importance of reporting incidents and combining this with the reward has been shown to produce results. This was consistently confirmed at both workshops where both staff and managers rated near-miss and incident reporting in the top 4 dimensions.

Management commitment to safety was also rated very highly at both workshops, which is confirmed by the results of the safety climate assessment, where the result for Dimension 1: “Management safety priority and capability” was higher than the result from the international database. This can be supported by the fact that senior managers personally visit individual sites and discuss with employees and that overstepping regulations is not accepted even when time pressure is present. Some middle management is motivated by special safety bonuses, which make up a significant part of their income. They aim to reinforce the personal responsibility of middle managers for the safety of the operations they manage. On the one hand, this is likely to lead to the supervision of subordinate employees and a rigorous pursuit of operational discipline; on the other hand, it may lead to the concealment of some shortcomings for fear of losing financial reward.

In these two areas, it is evident that the involvement of the workforce and management reflects positively on the perception of safety. It will therefore be necessary to look for tools and ways to involve staff at all levels more. This change can then influence the safety culture. As stated by Guldenmund (2018) to influence culture it is necessary, firstly, that employees understand their culture and, more importantly, that there is a shared understanding. For this, two-way communication based on respect is necessary. Therefore, it will be necessary to look to implement approaches that remove gaps and barriers to employee engagement and a reward and recognition system may be one of these.

* + 1. Limitations of the research

This research provides a preliminary insight into the safety culture and climate of the company; however, several limitations should be noted. Not all operations were visited, nor were all activities observed, which may affect the comprehensiveness of the findings. The opportunity to interview staff was also limited, restricting the depth of qualitative data collected. Additionally, only two "Understanding Your HSE Culture" workshops were conducted, with representation from all operations but participation limited to 37 employees, representing approximately 4% of the workforce. The return rate for the NOSACQ-50 questionnaire was 49%, which, while informative, does not provide a complete picture of the safety climate across the organization. These limitations highlight that the findings are exploratory and should be viewed as an initial probe rather than a definitive assessment.

* 1. Conclusion

This case study demonstrates the value of combining multiple methods to assess safety culture, offering a comprehensive approach that can guide meaningful improvements in HSE management. The analysis of documentation and expert interviews identified critical weaknesses in the company's HSE management system, while the results of the NOSACQ-50 questionnaire validated these findings with clear, quantitative insights into the state of safety culture. These data provided management with actionable information to support informed decision-making.

The "Understanding Your HSE Culture" workshops, based on the Hearts and Minds methodology, further enriched the assessment by highlighting specific strengths and weaknesses of the HSE system. They also engaged employees, deepened their understanding of safety culture, and encouraged discussion, leading to practical suggestions for fostering a proactive safety culture.

This combined approach not only proved effective in this case but also offers a valuable model for other companies interested in safety culture assessments. Rather than focusing on isolated metrics, this method emphasizes strengthening overall HSE performance to prevent injuries and accidents, creating a safer and more resilient workplace.

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