

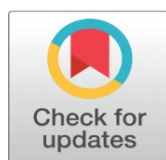
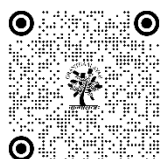
# IMPORTANCE OF OBSERVATION AND INTERVIEW METHODS AS DATA COLLECTION TOOLS IN THE OIL & GAS SECTOR: A STUDY ON ERGONOMICS AND SAFETY CULTURE

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## DOI

[10.29121/shodhkosh.v5.i6.2024.3590](https://doi.org/10.29121/shodhkosh.v5.i6.2024.3590)

**Funding:** This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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## ABSTRACT

One of the top ten countries in the world for oil production is the United Arab Emirates (UAE). Abu Dhabi, the sixth-largest oil producer in the world, is home to about 96% of the nation's estimated 100 billion barrels of proven oil reserves. On average, the United Arab Emirates produces 3.2 million barrels of petroleum and liquids every day. This study highlights the use of observation and interview techniques as efficient data gathering methods in the oil and gas industry, with a focus on the relationship between ergonomics and corporate safety culture. Operators, supervisors, safety officials, technicians, and occupational health specialists made up the study's sample population. Results show that, in contrast to conventional questionnaire approaches, observation and interview techniques offer deeper insights into workplace habits and practices. These techniques enable in-the-moment evaluations and sophisticated comprehension, which are essential for improving safety and ergonomic procedures. The outcomes show how effective they are at spotting important safety issues and providing useful advice.

**Keywords:** Ergonomics, Safety Culture, Observation Method, Interview Method, Oil & Gas Industry, Data Collection Tools

## 1. INTRODUCTION

The science of creating workspaces that accommodate people's strengths and limits is known as ergonomics. Ergonomics in the oil and gas sector can enhance worker safety, output, and well-being in a variety of locations, including offices, refineries, pipelines, and offshore platforms. Implementing ergonomic solutions is essential for preserving worker safety and productivity in the oil and gas sector, where workers frequently deal with long hours, difficult working conditions, and physically taxing activities.

Oil and gas companies can reap numerous advantages by implementing ergonomic concepts in the workplace, including decreased injury rates, increased productivity, and greater employee retention and satisfaction. The oil and gas industry is renowned for being one of the riskiest in the world, with even the smallest error potentially having devastating repercussions. The state of the workers and the requirement to continuously improve workplace safety protocols necessitate the ongoing development of a safety culture. Establishing a strong safety culture—that is, an

organization's and its workers' attitudes and behaviors around the value of workplace safety—is crucial to these advancements. Ergonomics, the science of applying appropriate design to the workplace, tools, and systems to improve worker safety, comfort, and performance, enters the picture here. In order to comprehend the idea, the cause-and-effect models, maturity models, and its relationship to other organizational, personal, and environmental elements, numerous studies have been carried out in the area of safety culture. There are still some unknowns that support the idea that not all aspects of safety culture are completely understood, even with this broad spectrum of research. This is especially true for activity that is crucial to safety and occurs in huge gas refinery complexes.

Accurately gathering information on ergonomic issues and procedures is essential to comprehending and improving safety culture. Traditional data collection tools like questionnaires have been the default choice due to their scalability and simplicity. However, they often fail to capture real-time behaviors, contextual factors, and nuanced insights necessary for meaningful interventions. This shortcoming has spurred a shift toward alternative methods, such as observation and interviews. These methods offer dynamic, interactive, and qualitative perspectives that can unveil hidden risks and foster active employee participation. This study evaluates the effectiveness of observation and interview techniques in the oil and gas sector of the UAE, aiming to highlight their potential for driving improvements in ergonomics and safety culture.

## 2. LITERATURE REVIEW

Many industries depend on frontline employees, usually operators of processing plants, to keep an eye out for and manage risks that could jeopardize the security of the processing operations. However, serious accidents and unplanned process safety events still happen, and they are becoming more frequent and severe in some industries (e.g. Marsh, 2018; U.S. Bureau of Labor Statistics, 2019). The 2010 BP the disaster at Deepwater Horizon/Macondo well blowout and explosion in the Gulf of Mexico (U.S. Chemical Safety and Hazard Investigation Board, 2016a); the 2010 Tesoro heat exchanger fire and explosion in Anacortes, Washington (U.S. Chemical Safety and Hazard Investigation Board, 2014); the 2015 Petrobras oil rig explosion in Brazil (Brazilian National Agency of Petroleum, 2015); the 2019 Philadelphia Energy Solutions refinery fire and explosion (U.S. Chemical Safety and Hazard Investigation Board, 2019); the 2020 Malaysian Petronas-Aramco refinery explosion (Ananthalakshmi, 2020); and the 2009 Montara oil spill off the coast of Australia (Montara Commission of Inquiry, 2010). Investigations into these incidents frequently show that gaps in the knowledge and information provided to the participating workers might play a significant role.

Error and risk management are addressed by safety culture as a component of corporate culture; nevertheless, review papers have proposed several methods for doing so. Many definitions of safety culture place emphasis on organizational, systemic, and individual elements, and there is some agreement that safety culture serves as the framework inside an organization that determines employee behavior (Choudhry et al., 2007a, Petitta et al., 2017). Despite their similarities, these definitions are provided in ways that offer varying degrees of thought or action to assure safety. According to Hale (2000), an organization's norms and values are defined by the attitudes, ideas, and perceptions that both individuals and groups share. This is known as the safety culture.

Assessment of this ergonomics and safety culture in an organization is a critical task. It involves tough decision making from top management and training and awareness among employees/ workers. The best possible and simple method to understand the challenges is through interviews and surveys through questionnaires.

It goes without saying that research procedures are a crucial component of any social science study since they establish its validity, trustworthiness, and success. Social scientists typically employ qualitative research in an effort to compile a comprehensive account of human behavior and beliefs within the circumstances in which they occur, as a result of their goal in gaining a thorough knowledge of human behavior (Rubin & Rubin, 2005).

### 2.1. TRADITIONAL QUESTIONNAIRE METHOD

Questionnaires remain a popular data collection approach due to their ability to reach a large number of individuals quickly and cheaply. They give standardized datasets that may be analyzed quantitatively. However, Johnson and Turner (2003) point out fundamental limitations of surveys, such as their reliance on self-reported data, which is frequently influenced by social desirability bias and respondents' interpretative limits. Furthermore, in fast-paced and high-risk industries such as oil and gas, questionnaires' static nature does not account for the complex, dynamic interactions between personnel, equipment, and the work environment.

## **2.2. OBSERVATION METHOD IN SAFETY RESEARCH**

Observation involves systematically monitoring and recording employee behaviors, task performances, and environmental conditions in their natural settings. Bell et al. (2015) highlight the strength of this method in identifying ergonomic risks that are not readily apparent through self-reporting tools. For example, observation can reveal subtle yet harmful postural issues, unsafe lifting techniques, or instances of equipment misuse. Additionally, the presence of a trained observer often encourages adherence to best practices, adding an immediate corrective dimension to this method.

## **2.3. INTERVIEW METHOD IN ERGONOMICS**

The benefits of conducting interviews include allowing respondents to "speak in their own voice and express their own thoughts and feelings" in addition to creating a comprehensive picture, analyzing language, and reporting in-depth perspectives of informants (Berg, 2007: 96). An interview is "a conversation, whose purpose is to gather descriptions of the [life-world] of the interviewee" in order to interpret the meanings of the "described phenomena," according to Kvale (1996: 174). According to Schostak (2006: 54), an interview is a prolonged dialogue between two people that tries to provide "in-depth information" on a certain topic or issue. Through this conversation, a phenomenon can be evaluated in terms of the meanings that the interviewees bring to it. One-on-one interviews are the most popular method for gathering such meanings, while there are other approaches as well. Focus groups are also common in addition to one-on-one interviews (Marshall & Rossman, 2006).

The interview technique provides a qualitative dimension to data collection, facilitating the in-depth study of employee perspectives, experiences, and suggestions about workplace ergonomics. Gill et al. (2008) emphasize the conversational quality of interviews, which increases transparency and trust. Employees frequently use this forum to address systemic issues such as inadequate training, resource limits, or misaligned corporate policies. Unlike questionnaires, interviews can adapt to the respondent's circumstances, providing greater flexibility and broader insights.

## **2.4. COMBINED USE OF OBSERVATION AND INTERVIEWS**

Combining interviewing and observation techniques provides a comprehensive understanding of safety culture and ergonomic practices. Observations provide objective, real-time data on workplace behaviors and risks, while interviews capture the subjective narratives and contextual factors underlying these behaviors. This complementary dynamic enables researchers to cross-validate findings, thereby improving data reliability and interpretability. Together, these methods address the gaps left by traditional tools, offering a robust framework for assessing complex, high-risk environments.

## **3. RESEARCH METHODOLOGY**

### **3.1. OBJECTIVES**

- 1) To assess the comparative effectiveness of observation and interview methods versus traditional questionnaires.
- 2) To identify critical ergonomic risks influencing safety culture within the oil and gas sector.
- 3) To evaluate the role of interactive, real-time data collection in formulating actionable safety interventions.

### **3.2. POPULATION AND SAMPLE**

The study focused on a diverse sample of operators, supervisors, safety officers, technicians, and occupational health professionals from oil and gas facilities across the UAE. This mixed demographic ensured that insights were drawn from a wide array of perspectives, enriching the understanding of workplace ergonomics and safety culture dynamics.

### 3.3. DATA COLLECTION METHODS

**Observation:** Observers documented ergonomic practices, task execution, and safety compliance during daily operations. Workstation design, personal protective equipment (PPE) adherence, equipment utilization, and manual handling skills were among the specific areas of focus.

**Interviews:** Participants' opinions on ergonomic difficulties, their alignment with company safety objectives, and recommendations for enhancement were investigated through semi-structured interviews. The evaluation of both explicit and implicit elements influencing workplace safety was made easier by the conversational approach.

### 3.4. DATA ANALYSIS TECHNIQUES

Data were analyzed using mixed-methods techniques. Quantitative data from observations were statistically examined for patterns and deviations, while qualitative data from interviews underwent thematic analysis to identify recurring narratives and underlying themes. Comparative analyses assessed the depth, accuracy, and applicability of insights derived from observation, interviews, and questionnaires.

## 4. RESULTS AND DISCUSSION

### 4.1. INSIGHTS FROM OBSERVATION AND INTERVIEWS:

Observation revealed significant ergonomic risks and safety lapses that were underreported in traditional questionnaire responses. Key findings include:

- Employees frequently engaged in awkward postures while operating heavy machinery.
- Manual handling tasks often lacked the support of ergonomic aids, leading to cumulative stress injuries.
- Non-compliance with PPE guidelines was observed, particularly during high-pressure operations.

Interviews provided a richer context for these findings, uncovering systemic barriers such as:

- Limited availability of ergonomic tools and training programs.
- A reactive rather than proactive approach to safety policy implementation.
- Gaps in communication between management and frontline employees regarding safety expectations and challenges.

### 4.2. COMPARATIVE ANALYSIS OF DATA COLLECTION METHODS

The study demonstrated the distinct advantages of observation and interviews over traditional questionnaires. Observations captured real-time, actionable data that highlighted latent safety risks, while interviews provided the nuanced, explanatory insights necessary to address these risks comprehensively. In contrast, questionnaires were limited by generic responses, incomplete self-reporting, and a lack of engagement from participants.

Effectiveness criteria included:

- **Depth of Insights:** Observation and interviews identified both overt and covert factors influencing safety culture, whereas questionnaires often yielded superficial data.
- **Accuracy:** Observed behaviors provided a direct, unbiased depiction of ergonomic practices, mitigating the inaccuracies inherent in self-reports.
- **Engagement:** Interviews fostered open communication, enabling participants to voice their concerns and recommendations, which enhanced the validity of the data.

## 5. CONCLUSION

This research establishes observation and interview methods as essential tools for data collection in the oil and gas sector. Their ability to capture real-time, nuanced information makes them invaluable for understanding and enhancing ergonomic practices and safety culture. By transcending the limitations of traditional questionnaires, these methods offer

actionable insights that can drive meaningful safety interventions. It is recommended that companies operating in high-risk industries incorporate these cutting-edge strategies into their standard safety management procedures.

## 6. RECOMMENDATIONS

- 1) **Standardize Interview and Observation Procedures:** To guarantee dependability and consistency, provide thorough rules for conducting and documenting interviews and observations.
- 2) **Safety Personnel Training:** Give managers and safety officers the tools they need to conduct frank interviews and make successful observations.
- 3) **Hybrid Data Collection Frameworks:** Integrate observation and interview techniques with questionnaires to combine quantitative and qualitative insights.
- 4) **Continuous Feedback Mechanisms:** Use insights from observations and interviews to implement iterative improvements in ergonomic practices and safety policies.

## CONFLICT OF INTERESTS

None.

## ACKNOWLEDGMENTS

None.

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