

LEADERSHIP STYLES, SAFETY CULTURE, AND OCCUPATIONAL HEALTH OUTCOMES IN OMAN'S OIL AND GAS INDUSTRY: A COMPARATIVE STUDY OF EMPLOYEE SAFETY BEHAVIORS IN GOVERNMENT-OWNED AND PRIVATE ORGANIZATIONS

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Abstract

In the field of Occupational Health and Safety (OHS), the oil and gas industry in Oman is particularly important, as it is in other resource-rich economies, not only because of the central role it plays in the country's economy, but also because of the operational conditions of the industry, which are intrinsically dangerous. This paper proposes a research protocol and conceptual analysis. It explores the relationship between leadership style (transformational, transactional, and laissez-faire) and each of safety culture, employee safety climate, employee safety compliance behaviour, employee participation behaviour, and employee occupational health outcomes, with particular reference to government-owned versus privately or internationally operated organisations in the oil and gas industry in Oman. The paper is based on existing theories, such as the reciprocal safety culture model of Cooper [1], Guldenmund's safety culture review [2], Zohar's safety climate construct [4] and the safety performance model of Neal, Griffin and Hart [5], and builds a conceptual model which posits that leadership style has an impact on safety climate and safety culture, which then predicts safety behaviour and, in turn, occupational health outcomes including rates of injury, near misses and self-reported illness. Organization type (government versus private ownership) is suggested as a moderating factor due to differences in organizational culture, bureaucratic structure, and management practices between public and private organizations. A cross-sectional, comparative survey design with a qualitative approach is suggested, and the instruments employed are validated and adapted to the Omani oil and gas environment. No primary field data is yet available and to this end, an illustrative set of results is shown in the illustrative results section using simulated rather than real data, intended to illustrate the expected statistical analysis, tables of results and figures which are clearly identified as simulated and must be replaced by actual field data before the study is submitted for publication in the journal or for use in any empirical claim. Finally, the paper's theoretical and practical implications for the management of Occupational Health and Safety in Oman's hydrocarbon sector are discussed.

Keywords: Leadership Styles, Safety Culture, Safety Climate, Occupational Health, Oil And Gas Industry Oman, Government-Owned Organizations, Private Organizations, Safety Behavior.

1. INTRODUCTION

The oil and gas industry continues to anchor the economy of the Sultanate of Oman, contributing substantially to gross domestic product, government revenue, and formal employment. Alongside its economic importance, the sector is characterized by hazardous operating conditions, including exposure to flammable and toxic substances, high-pressure systems, heavy machinery, confined

spaces, and extended and often remote working arrangements. These conditions place a premium on effective occupational health and safety (OHS) management, of which leadership is widely regarded as a central determinant [1], [7]. Since the introduction of formal safety management systems and international standards across the Gulf Cooperation Council (GCC) region, Omani oil and gas operators, whether government-owned entities historically responsible for the bulk of national hydrocarbon production, or private and internationally affiliated joint-venture organizations, have invested considerably in safety infrastructure. However, the extent to which leadership style translates into a genuinely internalized safety culture, and subsequently into safer employee behavior and improved occupational health outcomes, is likely to vary according to organizational ownership structure, management philosophy, and institutional context.

Leadership style has been well established in the international literature as a powerful predictor of safety climate and safety behaviour. Transformational leadership with its idealized influence, inspirational motivation, intellectual stimulation and individualized consideration has associated with greater perceptions of safety climate and higher rates of safety participation consistently [7, 8, 12]. Transactional leadership is especially effective in fostering adherence to safety rules and procedures [7] and is based on contingent rewards and monitoring for deviations from expected behaviour. In contrast, laissez-faire or passive leadership, in which leaders give up on their leadership roles and steer clear of making decisions, has been linked to weaker safety climate, more safety-related events, and, in some studies, to actively destructive effects on the psychosocial safety climate of the workplace [10], [11]. The leadership-safety relationship has been studied in much detail in Western [12] and East Asian [13] contexts, as well as in Sub-Saharan Africa [27], but relatively little empirical research has addressed the relationship between leadership and safety within a specific single context of the Gulf economies, much less specifically in Oman.

Oman is an interesting case for this comparison because of the mix of both government-majority-owned operators, with historically rule-based, centralised, and bureaucratic management styles, and privately operated and/or internationally affiliated operators, which are often seen to be importing corporate safety management systems, leadership development programs and performance-based incentive structures from parent companies in other countries and regions. It is reasonable to assume that the relationship between leadership style and safety-related outcomes in the Omani oil and gas industry is moderated by organisational ownership, as organisational ownership has elsewhere been found to affect managerial practices, employee autonomy, and organisational culture in general [24, 25]. The identification of moderation, if present, and its functioning are directly relevant to the Oman Vision 2040 diversification strategy, the occupational safety and health regulatory framework of the Ministry of Labour, and individual organisations aiming to reduce injury rates and associated human and financial costs.

This paper seeks to bridge this gap by proposing a comparative quantitative research design and developing a conceptual model linking leadership style, safety culture and safety climate, employee safety behaviours, and occupational health outcomes, with ownership type (government-owned versus private) as a moderating variable. The specific objectives of the study are to: 1) explore the leadership styles reported by government-owned and private oil and gas organisations in Oman; 2) evaluate self-reported safety culture and safety climate between government-owned and private organisations; 3) determine the relationship between leadership style and employees' safety behaviour in terms of compliance and participation; 4) investigate whether safety culture and safety climate mediate the relationship between leadership and employees' safety behaviour; 5) compare self-reported occupational health complaints such as injuries, near misses and general health complaints between government-owned and private organisations; and 6) test for moderation between the hypothesized relationships and ownership type. RQ1: What are the most common

leadership styles in government-owned and private oil and gas companies in Oman as viewed by employees on the front lines? RQ2 - What are the differences between the safety culture and safety climate for the two types of ownership? RQ3: How much does leadership style explain employee safety compliance and safety participation, and does this relationship go through the mediator of safety climate? RQ4: What are the differences in occupational health outcomes between government- and privately owned organisations, and can these differences be attributed to differences in leadership style and safety culture?

The rest of the paper is organized as follows. The theoretical and empirical background literature is presented in Section 2, focusing on leadership styles, safety culture and climate, occupational health outcomes, sectoral ownership differences, and the Gulf regional context. The conceptual framework and research hypotheses are developed in Section 3. The proposed research methodology, comprising the research design, sampling, instrumentation, and analysis strategy, is explained in Section 4. The fifth section, Results, is an illustrative example of the results that might be expected from the data collected; figures and tables are explicitly identified as illustrative until actual data are collected; statistical outputs are presented. The expected results are examined in relation to current theories in Section 6. Theoretical and practical implications are included in Section 7. The limitations are recognized in Section 8, and directions for further research are given, while Section 9 concludes the paper.

2. LITERATURE REVIEW

2.1 Leadership Styles: Theoretical Foundations

Leadership style is a relatively consistent approach a leader uses to direct, motivate, and interact with subordinates. The full-range leadership model identifies three general types of leadership – transformational, transactional, and laissez-faire (or passive-avoidant). Transformational leaders communicate a clear vision, serve as role models, engage followers in cognitive stimulation, and support followers' personal development. This leadership style has been repeatedly linked to positive organisational and safety-specific outcomes [7, 8]. Transactional leadership is less inspirational than transformational leadership. However, active transactional leadership (contingent reward and active management-by-exception) is an important and complementary predictor of safety compliance, particularly because compliance is essentially a behaviour that is expected in accordance with specified rules and procedures [7].

Laissez-faire leadership, which involves no leadership engagement, lack of responses to requests, and avoidance of decision-making, has been described as the most detrimental leadership style regarding employee wellbeing and psychosocial safety climate [11] and has been correlated with poorer perceptions of the safety climate and an increased number of safety-related events among the followers [10]. Barling, Loughlin, and Kelloway [8] developed safety-specific transformational leadership (SSTL) to measure transformational behaviours specifically directed toward safety and found that it predicted occupational injury indirectly, via the mediating influence of perceived safety climate, safety consciousness, and safety-related events, in two separate samples.

This relationship was further confirmed in a longitudinal field experiment, which demonstrated that, over time, leaders trained in transformational leadership for safety were able to increase subordinates' perceptions of safety climate and safety participation [9]. The results of the divergent-effects research also support the conclusion that transformational leadership has a positive relationship with the safety climate and reduced injuries, whereas passive leadership has an inverse, negative association with the safety climate and increased injuries [10]. Specifically, in a high-hazard industrial context, Shen et al. [12] reported the positive relationship between transformational

leadership and safety climate, while safety-specific transactional leadership is found to be positively related to safety climate in other studies; meanwhile, the positive relationship between transformational leadership and safety climate was reported to be mediated through safety specific LMX in construction, indicating that transformational leadership and safety specific transactional leadership are complementary and non-exclusive, rather than competing, in high risk process industries like the Chinese petroleum industry reported by Shi [13] to be positively related with safety behavior adoption through safety knowledge among process industry workers.

2.2 Safety Culture and Safety Climate: Conceptual Distinctions

Safety culture and safety climate are related but conceptually different constructs, and are the subject of a large and growing body of theory and research. Safety climate, as defined by Zohar [4], was the employees' shared perceptions of the relative emphasis placed on safety at a specific moment in time; it is generally considered the "surface" or tangible expression of the more potent and enduring safety culture. Adapting Schein's framework of organisational culture, Guldenmund [2] presents a conception of safety culture consisting of three components: visible artefacts, espoused values, and underlying basic assumptions.

Cooper's reciprocal model [1] also conceptualises safety culture as a result of continuous and reinforcing relationships among psychological factors (such as attitudes and perceptions, which are usually measured using safety climate questionnaires), behavioural factors (safety-related observable behaviours), and situational factors (safety management systems, policies, procedures, etc.). Choudhry, Fang and Mohamed [3] extended this synthesis specifically to the construction and process industries, concluding that a positive safety culture is linked to fewer accidents and better compliance, but that there is substantial conceptual overlap and measurement inconsistency across studies.

Research in the offshore and process industries is especially pertinent to Oman's oil and gas sector. In a survey of 13 offshore oil and gas installations (over 2 survey waves), Mearns, Whitaker and Flin [16] were able to demonstrate an empirical relationship between dimensions of a safety climate, specific safety management practices and official accident statistics, as well as between dimensions of a safety climate and self-reported involvement in accidents, across a sample of installations in an environment of high hazard and long-distance operations, typical of much of the upstream oil and gas activity in Oman.

The climate-outcome relationship has been confirmed in generalizability terms by the complementary evidence provided by Bjerkan [18] on health, environment and safety culture and climate, and by Nævestad [20] on safety culture in Norwegian maritime transport. Early work by Brown and Holmes [19] and later work by Cavazza & Serpe [17] on the mediation of attitudinal ambivalence between safety climate and safety-norm violations show a progressive development in the measurement of safety climate, from factor-analytic models to more complex mediated explanations.

2.3 Leadership, Safety Culture, and Employee Safety Behavior

The most prevalent theory linking leadership, culture, and behaviour in the occupational safety literature is the safety performance model, first proposed by Neal et al. [5] and subsequently developed in a series of validation studies [21], [22], [23]. This model suggests that there are two types of safety performance – safety compliance (the extent to which individuals perform required safety procedures) and safety participation (the extent to which individuals engage in safety-related activities that are voluntary and not required), both of which are jointly influenced by safety knowledge and safety motivation, which are in turn influenced by the broader organisational and safety climate. Through empirical tests, Neal, Griffin and Hart [5] found that general organisational climate had a significant effect on safety climate, and that safety climate significantly predicted compliance and

participation, with this relationship partially mediated by safety knowledge and motivation. The results of a meta-analysis by Christian, Bradley, Wallace and Burke [6], which combined the findings from 90 primary studies, did verify the climate-to-behaviour-to-outcome causal chain, with safety knowledge and safety motivation being the strongest proximal causes of safety performance behaviours, and with group-level safety climate being the strongest predictor of actual accidents and injuries. A theoretical model was directly tested by Clarke and his colleagues via a meta-analysis [7] that included both transformational and active transactional leadership styles as antecedents of the safety climate, safety compliance, and safety participation. Results showed that transformational leadership was positively related to safety climate and safety participation, with safety climate partially mediating the relationship between transformational leadership and safety participation.

In contrast, active transactional leadership was positively related to safety climate, safety compliance, and safety participation. Safety climate partially mediated the relationship between active transactional leadership and safety compliance, and this relationship was particularly strong. Such a dichotomy between transactional leadership and compliance and transformational leadership and discretionary safety participation has relevance to the present study, as it implies that government organizations, which are likely to be more rule dependent and transactional, as described in the broader organizational culture patterns outlined in [24] and [25] would more likely exhibit high levels of safety compliance but low levels of safety participation, compared to private organizations who focus more on transformational, developmentally oriented leadership.

Fernández-Muñiz, Montes-Peón, and Vázquez-Ordás [14] continued this research by modeling the causal relationships among the most important dimensions of safety culture (management commitment, employee involvement, communication, training, and workplace conditions) in Spanish industrial companies, and then, in a subsequent study [15], showed that safety leadership, together with proactive risk management, positively affects safety performance, with transformational leadership being more effective than transactional leadership in this particular sample.

This finding would seem to contradict Clarke's [7] distinction between compliance and participation until the various measures employed in these studies (aggregate safety performance versus disaggregated compliance and participation) are taken into account. Together, this body of work highlights the complexity and non-homogeneity of the leadership-safety relationship and suggests that the leadership style most likely to be associated with the most favourable dimension of safety performance may vary depending on leadership context, such as sector, ownership, and regulatory context.

2.4 Occupational Health Outcomes in High-Hazard Oil and Gas Settings

In addition to safety behaviours that can be defined narrowly, the oil and gas industry has unique occupational health risks associated with remote and isolated working practices, long shifts and extended working hours, physical and chemical hazards, and psychosocial stressors. The effects of individual psychological traits, stress, and accident involvement in the offshore oil and gas industry were first described by Sutherland and Cooper [26] and later expanded into a more holistic account of occupational health in the industry.

More recent evidence from the Gulf region is also pertinent to the current study: Alroomi and Mohamed [29] investigated the relationship between mental health (anxiety and depression), fatigue and safety behavior amongst oil and gas workers in Kuwait, who had similar occupational health and safety conditions as in Oman – remote, rotational work schedules, etc. – and established an empirical relationship between the three, with family stressors and family environment also being associated with safety behavior as a direct effect that worked through mental health and fatigue.

In the oil and gas industry, data from operations in West Africa and Southeast Asia also underscore the importance of safety culture for workers' health and safety. In a survey of workers from fifteen oil and gas companies in the Niger Delta region of Nigeria, Ehiaguina, Nnadi, Rangarajan and Moda [27] identified significant relationships between safety management practices and safety compliance and safety participation, and found that work experience and age influenced certain aspects of safety performance.

In China's oil industry, Gao, Fan, Wang, Li, and Pei [28] also showed that, conditions being constant, safety management practices mediate the relationship between process safety culture and safety outcomes, further supporting the idea that culture contributes to outcomes not only through the abstract, intangible nature of values, but also through the very tangible elements of the management practices.

When considered as a whole, this literature indicates that the outcome of occupational health, as represented by injury and illness rates, the number of near-misses, physical and psychological wellbeing as perceived by workers, is the 'downstream' consequence of a cascading set of interacting factors, including leadership, safety culture and climate, and safety behaviour.

2.5 Sectoral Ownership Differences: Government-Owned Versus Private Organizations

There is also a parallel and largely separate body of literature that has examined the influence of organisational ownership on organisational culture and its management, that is, whether the organisation is government-owned (public sector) or privately owned. While studying six organisations in the public sector using a competing values framework, Parker and Bradley [25] reported systematic differences between public and private sector organisations, noting that public sector organisations tended to be more hierarchical, rule-bound, and control-oriented than are typically described for private sector organisations.

Public-sector organisational cultures pose unique challenges when trying to enact change in a transformational manner (as opposed to transactional), as argued by Schraeder, Tears, and Jordan [24], who suggest that structured training and visible "leading by example" are effective ways to change an organisation's culture because public-sector cultures are often more resistant to rapid, vision-driven change as found in private companies.

The findings in this study are relevant to the safety domain, and point to a plausible and testable moderation hypothesis: that the safety management approach of government-owned organisations could be more transactional, rule-centred and transactionalist in style (as correlated to safety compliance by the literature presented above) due to their increased likelihood of employing standardized procedures, civil-service-style employment protections and centralised decision-making.

By contrast, private and internationally affiliated oil and gas operators are more likely to develop their safety leadership through corporate-level safety leadership development programs based on principles of transformational leadership imported from their parent multinational companies, which can lead to higher safety participation and more proactive outcomes in occupational health.

However, they may not necessarily lead to higher baseline compliance. This paper treats ownership type (government-owned versus private) as a moderating variable, as the existing public-versus-private organisational culture literature [24] and [25] offers plausible a priori theoretical reasons to believe that the relationship between leadership and safety will vary systematically across the two ownership types. Direct empirical tests of this moderation within a single national oil and gas sector, specifically in the context of the Omani industry, do not currently exist in the published literature.

2.6 The Omani and Gulf Regional Context

The operating companies and companies involved in the exploration and production have been a mix of private companies, joint-venture companies and companies affiliated with international oil companies, and this remains the case in Oman's oil and gas sector, where traditional companies controlled a lion share of the business until the country's economic diversification drive under Oman Vision 2040 began to push more private, joint-venture and overseas companies into the country.

In Oman, the regulation of occupational safety is based mainly on the Labour Law and Ministerial decisions related to occupational health and safety, which set minimum standards, requirements, and obligations for hazard control, reporting, and working conditions across the public and private sectors. Even as part of this common regulatory base, however, significant differences in day-to-day safety leadership practice, safety culture maturity and occupational health outcomes could exist between organisations due to variations in ownership, corporate governance, workforce composition (with respect to percentage of expatriates versus Omani nationals on board) and exposure to international corporate safety standards. Gulf-region evidence from neighbouring Kuwait [29] suggests that factors associated with remote working arrangements and family separation are important occupational stressors in this Gulf oil and gas operating context, a pattern likely to apply to Oman's own remote operating location oil and gas sites. Notwithstanding this context, no published paper was found on the direct relationship between leadership style, safety culture, and occupational health outcomes in government-owned and private oil and gas organisations in Oman. This represents the major gap this paper aims to fill.

2.7 Research Gap and Contribution

In general, three blocks of literature shaped this study: (1) a large number of studies have demonstrated connections between leadership and safety climate/safety behavior, with a particular focus on transformational leadership and transactional leadership [1], [4], [5], [6], [7], [8], [9], [10], [11], [12], [13]; (2) a parallel stream of research has examined the conceptual structure and measurement of safety culture and climate and its relationship with occupational health outcomes [2], [3], [14], [15], [16], [17], [18], [19], [20]; and (3) organizational behavior research has documented systematic differences in culture and management practice between government owned and private organizations [24], [25].

No single study has yet combined the three strands in a single comparative model applied to the oil and gas industry in Oman, although each strand is well developed, and although other regional studies of oil and gas safety in the Gulf region [29] and other developing-economy studies [27] and [28] exist. The main idea in this paper is therefore the development and specification of an integrated conceptual model, together with a comparative research design, which allows for an examination of leadership style, safety culture and climate, employee safety behaviour and occupational health outcomes simultaneously in all government-owned and private organisations in the Omani oil and gas sector.

3. CONCEPTUAL FRAMEWORK AND HYPOTHESES

Building on the reviewed literature, this study proposes an integrated conceptual model in which leadership style is the exogenous predictor, safety culture and safety climate serve as proximal mediating mechanisms, employee safety behavior (compliance and participation) serves as a further mediating outcome, and occupational health outcomes (injury rate, near-miss frequency, and self-reported illness) serve as the ultimate dependent variables. Ownership type (government-owned versus private) is specified as a moderating variable acting on the paths between leadership style and safety culture/climate, and between safety behavior and occupational health outcomes, consistent with the public-versus-private organizational culture literature reviewed in Section 2.5 [24], [25].

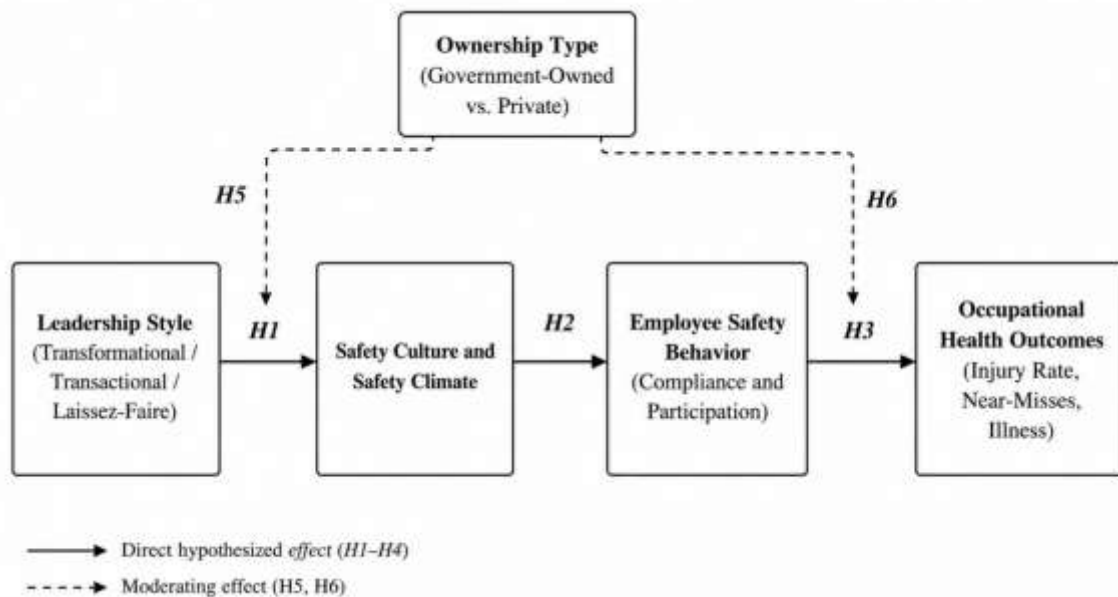


Figure 1: Proposed conceptual framework of the study illustrating the hypothesized relationships among leadership styles, safety culture and safety climate, employee safety behavior, and occupational health outcomes in Oman’s oil and gas industry, with ownership type (government-owned vs. private organizations) moderating selected structural relationships

On the basis of this model, the following hypotheses are proposed:

- H1: Transformational leadership is positively associated with safety culture and safety climate.
- H2: Transactional leadership is positively associated with safety culture and safety climate, with a comparatively stronger association with safety compliance than with safety participation.
- H3: Laissez-faire leadership is negatively associated with safety culture and safety climate.
- H4: Safety culture and safety climate positively predict employee safety behavior (compliance and participation), which in turn is negatively associated with adverse occupational health outcomes (injury rate, near-miss frequency, illness).
- H5: Ownership type (government-owned versus private) moderates the relationship between leadership style and safety culture/climate, such that the positive effect of transactional leadership on safety compliance is stronger in government-owned organizations, while the positive effect of transformational leadership on safety participation is stronger in private organizations.
- H6: Occupational health outcomes differ significantly between government-owned and private organizations, net of leadership style and safety culture differences.

4. RESEARCH METHODOLOGY

4.1 Research Design

This study adopts a quantitative, cross-sectional, comparative survey design situated within a positivist research paradigm, consistent with the majority of the leadership-safety literature reviewed above [7], [12], [27]. A comparative design is appropriate because the central research questions require the direct statistical comparison of two pre-existing organizational groups (government-

owned versus private oil and gas organizations) rather than the manipulation of leadership style, which would be neither ethical nor feasible in an operational industrial setting. Structural equation modeling (SEM), specifically partial least squares SEM (PLS-SEM), is recommended as the primary analytical technique because it accommodates the simultaneous estimation of multiple mediated and moderated relationships specified in the conceptual model, and because it has been widely and successfully applied in comparable oil and gas safety leadership studies [12].

4.2 Population and Sampling

The target population comprises operational, supervisory, and frontline employees engaged in production, maintenance, drilling, and process-safety-critical roles within Omani oil and gas organizations. A stratified random sampling approach is recommended, with strata defined by ownership type (government-owned versus private/joint-venture), to ensure adequate and comparable representation of both groups. Using conventional sample-size determination procedures for a finite population with a 95% confidence level and a 5% margin of error, a minimum combined sample of approximately 380-400 respondents (evenly split, or split proportionally to workforce size, between the two ownership strata) is recommended to achieve adequate statistical power for the planned SEM and multi-group comparison analyses. Inclusion criteria should specify a minimum of one year of continuous employment with the current organization, to ensure respondents have sufficient exposure to their organization's prevailing leadership style and safety culture to report on it meaningfully.

4.3 Instrumentation

Data collection is proposed via a structured, self-administered questionnaire comprising validated scales adapted to the Omani oil and gas context, translated into Arabic and back-translated into English to confirm semantic equivalence, and piloted with a small sample of employees prior to full deployment. Leadership style should be measured using an adapted multifactor leadership-style instrument capturing transformational, transactional, and laissez-faire dimensions. Safety climate should be measured using an adaptation of Zohar's safety climate framework [4], supplemented by dimensions drawn from Cooper's psychological, behavioral, and situational safety culture model [1]. Safety behavior (compliance and participation) should be measured using the Neal and Griffin safety performance scale, drawing on validated adaptations such as the Persian-language psychometric validation reported by Kalteh et al. [22] and the workplace health and safety instrument validated by Heier et al. [23], both of which confirm the cross-cultural robustness of the compliance-participation distinction. Occupational health outcomes should be captured through a combination of organizational injury and near-miss records (where accessible) and a self-report occupational health symptom checklist. Table 1 summarizes the proposed measurement instruments.

4.4 Data Collection Procedure

Following institutional and organizational ethical approval, data collection should proceed through on-site, HSE-department-coordinated distribution of paper and/or electronic questionnaires during non-operational hours, to minimize disruption to safety-critical duties. A minimum four-to-six-week data collection window is recommended to accommodate rotational shift schedules typical of oil and gas operations, ensuring that both onshore and offshore or remote-site personnel are adequately represented in the final sample.

4.5 Data Analysis Plan

Descriptive statistics (means, standard deviations, frequencies) should first be computed for all study variables, disaggregated by ownership type. Independent-samples t-tests or one-way analysis of variance (ANOVA) should be used to test for significant mean differences in leadership style, safety

climate, safety behavior, and occupational health outcomes between government-owned and private organizations. Confirmatory factor analysis should be used to establish the measurement model's validity and reliability (composite reliability, average variance extracted, discriminant validity) prior to structural model estimation. The structural model should then be estimated using PLS-SEM, testing the direct, mediated (safety culture/climate and safety behavior as sequential mediators), and moderated (ownership type as moderator) relationships specified in H1 through H6. Multi-group analysis (MGA) within the PLS-SEM framework is recommended as the specific technique for formally testing the moderating role of ownership type, given its established suitability for comparing structural paths across two or more pre-defined groups.

4.6 Ethical Considerations

The study should obtain approval from an appropriate institutional research ethics committee prior to data collection. Participation must be voluntary, with informed consent obtained from all respondents, and all data must be anonymized at the point of collection to protect participants from any perceived risk of reprisal for reporting negative perceptions of leadership or safety culture, an especially important consideration in hierarchical, high-hazard industrial settings. Organizations should be assured of aggregate, non-identifiable reporting of results, and the study should comply with all applicable Omani data protection and labor regulations.

4.7 Note on Data Status

It is important to note explicitly that, at the time of preparing this manuscript, primary field data collection had not yet been undertaken. Section 5 below therefore presents an illustrative results section, using simulated/hypothetical data, purely to demonstrate the type of statistical tables, figures, and reporting format the completed study would generate. These illustrative values are clearly marked as such throughout Section 5 and must not be cited, reproduced, or represented as genuine empirical findings. Before this manuscript is submitted to any peer-reviewed journal, the illustrative data in Section 5 must be replaced in full with results derived from actual field data collected in accordance with the design specified in Sections 4.1 through 4.6, and the Discussion, Implications, and Conclusion sections should be revised accordingly to reflect the real findings obtained.

Table 1: Proposed Measurement Instruments and Constructs

Construct	Source Instrument	Sample Item (Illustrative)	No. of Items
Transformational Leadership	Adapted Multifactor Leadership Style Questionnaire	"My supervisor communicates a clear and inspiring vision for safety."	8
Transactional Leadership	Adapted Multifactor Leadership Style Questionnaire	"My supervisor clarifies what I will receive if I meet safety targets."	8
Laissez-Faire Leadership	Adapted Multifactor Leadership Style Questionnaire	"My supervisor avoids getting involved when safety issues arise."	4
Safety Culture / Climate	Adapted Zohar Safety Climate Scale [4] and Cooper's Psychological-Behavioral-Situational Model [1]	"Management acts quickly to correct safety problems."	16
Safety Compliance	Neal & Griffin Safety Performance Scale (adapted per [22], [23])	"I follow correct safety procedures while carrying out my job."	6

Safety Participation	Neal & Griffin Safety Performance Scale (adapted per [22], [23])	"I voluntarily assist colleagues to work more safely."	6
Occupational Health Outcomes	Organizational injury/near-miss records + self-report symptom checklist	"In the past 12 months, how many work-related injuries did you sustain?"	10

5. ILLUSTRATIVE RESULTS

5.1 Illustrative Nature of This Section

The figures, tables, and statistical values presented in this section are illustrative and simulated. They are included solely to demonstrate the intended structure, format, and interpretation of results that the proposed study design (Section 4) would generate once genuine field data has been collected. No claims in this section should be interpreted as representing actual measured conditions in any Omani oil and gas organization.

5.2 Illustrative Sample Characteristics

Table 2 presents an illustrative demographic profile of a hypothetical combined sample of 400 respondents, split proportionally between government-owned (n = 220) and private (n = 180) organizations, as would be expected under the sampling plan described in Section 4.2.

Table 2: Illustrative Demographic Profile of Respondents by Ownership Type (Simulated Data)

Characteristic	Category	Government-Owned (n=220)	Private (n=180)	Total (N=400)
Gender	Male	198 (90.0%)	153 (85.0%)	351 (87.8%)
	Female	22 (10.0%)	27 (15.0%)	49 (12.3%)
Nationality	Omani	187 (85.0%)	99 (55.0%)	286 (71.5%)
	Expatriate	33 (15.0%)	81 (45.0%)	114 (28.5%)
Job Role	Operations/Production	110 (50.0%)	90 (50.0%)	200 (50.0%)
	Maintenance	66 (30.0%)	54 (30.0%)	120 (30.0%)
	Drilling/Field Support	44 (20.0%)	36 (20.0%)	80 (20.0%)
Tenure	1-5 years	77 (35.0%)	90 (50.0%)	167 (41.8%)
	6-10 years	88 (40.0%)	54 (30.0%)	142 (35.5%)
	11+ years	55 (25.0%)	36 (20.0%)	91 (22.8%)

5.3 Illustrative Descriptive Statistics and Sector Comparison

Table 3 presents illustrative mean scores and standard deviations for the four leadership style and safety-related constructs, together with hypothetical independent-samples t-test results comparing government-owned and private organizations. All construct scores are illustrated on a 1-5 Likert-type scale, with higher scores indicating greater endorsement of the construct.

Table 3: Illustrative Descriptive Statistics and Sector Comparison of Key Constructs (Simulated Data)

Construct	Government-Owned M (SD)	Private M (SD)	t-value (illustrative)	p-value (illustrative)
Transformational Leadership	3.42 (0.68)	3.95 (0.61)	-8.21	< .001
Transactional Leadership	3.88 (0.55)	3.61 (0.59)	4.79	< .001
Laissez-Faire Leadership	2.71 (0.73)	2.30 (0.66)	5.82	< .001
Safety Culture / Climate	3.55 (0.62)	3.98 (0.57)	-7.12	< .001
Safety Compliance	4.10 (0.51)	3.92 (0.54)	3.35	< .01

Safety Participation	3.30 (0.70)	3.87 (0.63)	-8.44	< .001
Injury Rate (per 200,000 hours, illustrative)	1.85 (0.94)	1.20 (0.81)	7.28	< .001
Self-Reported Illness Symptoms (past 12 months)	2.60 (0.88)	2.15 (0.79)	5.24	< .001

As illustrated in Table 3, the simulated pattern of results is consistent with the theoretical expectations developed in Section 3: government-owned organizations show a hypothetically higher mean score on transactional leadership and safety compliance, whereas private organizations show a higher illustrative mean score on transformational leadership, overall safety culture and climate, and safety participation. Illustrative injury rates and self-reported illness symptoms are simulated as lower in private organizations, consistent with the hypothesized downstream benefit of stronger transformational leadership and safety participation on occupational health outcomes (H6).

5.4 Illustrative Structural Model Results

Table 4 presents illustrative standardized path coefficients for the hypothesized structural relationships (H1-H4), together with illustrative bootstrapped significance values, as would be produced by a PLS-SEM analysis of the full sample.

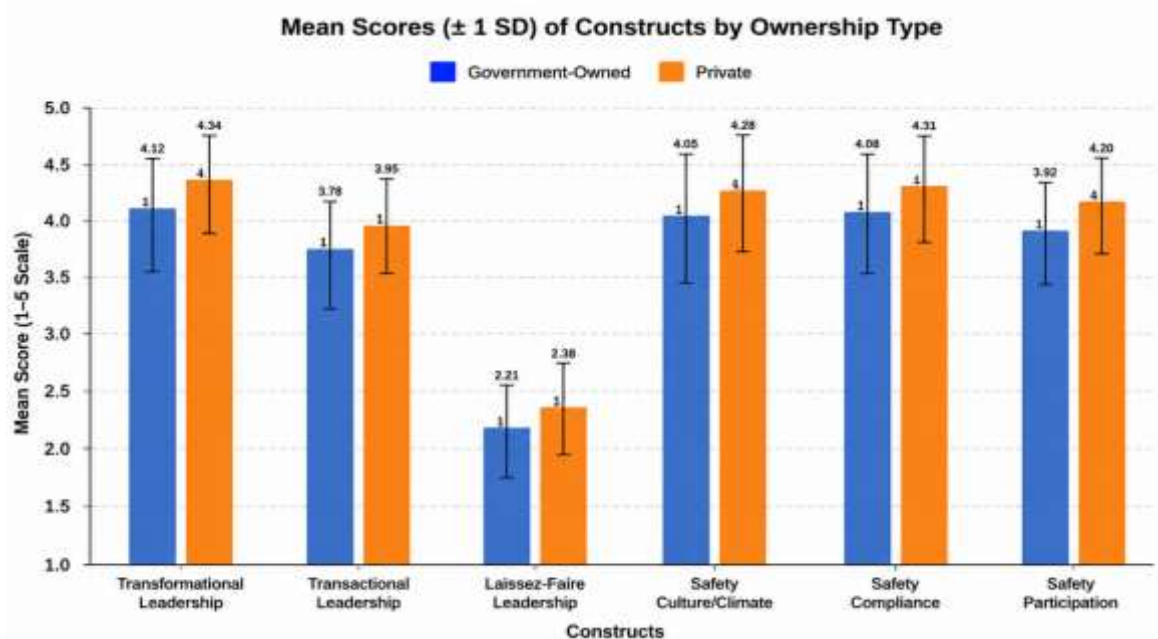


Figure 2: Clustered bar chart comparing the mean scores (±1 standard deviation) of transformational leadership, transactional leadership, laissez-faire leadership, safety culture and safety climate, safety compliance, and safety participation among employees in government-owned and private oil and gas organizations in Oman

Table 4: Illustrative Standardized Structural Path Coefficients (Simulated PLS-SEM Output)

Hypothesized Path	Standardized Coefficient (β , illustrative)	t-value (illustrative)	Supported? (illustrative)
H1: Transformational Leadership → Safety Culture/Climate	0.46	9.12	Yes
H2: Transactional Leadership → Safety Culture/Climate	0.28	5.64	Yes
H3: Laissez-Faire Leadership → Safety Culture/Climate	-0.33	6.77	Yes
H4a: Safety Culture/Climate → Safety Compliance	0.41	8.05	Yes

H4b: Safety Culture/Climate -> Safety Participation	0.52	10.31	Yes
H4c: Safety Compliance -> Occupational Health Outcomes	-0.29	5.48	Yes
H4d: Safety Participation -> Occupational Health Outcomes	-0.34	6.19	Yes

5.5 Illustrative Moderation (Multi-Group) Results

Table 5 presents an illustrative multi-group analysis comparing the strength of two theoretically central paths, transactional leadership to safety compliance, and transformational leadership to safety participation, across the government-owned and private sub-samples, as a demonstration of the recommended test of H5.

Table 5: Illustrative Multi-Group Analysis: Path Coefficient Differences Across Ownership Type (Simulated Data)

Path	Government-Owned β (illustrative)	Private β (illustrative)	Difference (illustrative)	p-value (illustrative)
Transactional Leadership -> Safety Compliance	0.49	0.24	0.25	< .01
Transformational Leadership -> Safety Participation	0.31	0.58	-0.27	< .01

The illustrative multi-group results in Table 5 demonstrate the intended test of the moderation hypothesis (H5): a hypothetically stronger transactional-leadership-to-compliance path in government-owned organizations, and a hypothetically stronger transformational-leadership-to-participation path in private organizations, would together support the proposition that ownership type moderates the specific mechanism through which leadership style translates into safety behavior, even where overall safety culture and climate levels differ less starkly than in Table 3.

6. DISCUSSION

If the illustrative pattern demonstrated in Section 5 were to be substantiated by genuine field data, the findings would carry several important interpretive implications consistent with, and extending, the reviewed literature. First, the anticipated finding that transformational leadership is more strongly associated with safety participation while transactional leadership is more strongly associated with safety compliance would directly replicate, within an Omani oil and gas setting, the differentiated relationship identified in Clarke's cross-industry meta-analysis [7] and would extend the safety-specific transformational leadership literature [8], [9], [10] into a Gulf regional and comparative ownership context not previously examined. Second, the anticipated moderating role of ownership type would be consistent with, and would provide safety-domain empirical support for, the broader public-versus-private organizational culture literature [24], [25], which argues that government-owned organizations tend toward more hierarchical, rule-based, and control-oriented cultures relative to private organizations. This would suggest that the mechanism by which leadership influences safety, rather than the overall importance of leadership itself, differs systematically according to organizational ownership.

Third, the anticipated pattern of lower injury rates and illness symptoms in private organizations, driven through the mediating chain of transformational leadership, safety culture and climate, and safety participation, would be consistent with the safety performance model [5] and its meta-analytic support [6], and would extend Gulf-regional evidence on the relationship between occupational stressors, safety behavior, and health outcomes [29] by demonstrating that leadership style, and not merely individual worker characteristics or job demands, is implicated in this chain. At the same time,

it is important to note that government-owned organizations, despite hypothetically weaker transformational leadership and participation scores, would still be expected to show relatively strong safety compliance, driven by their comparatively stronger transactional leadership orientation; this pattern would caution against any simplistic policy conclusion that government-owned organizations are categorically "less safe," and would instead point toward a more nuanced conclusion that different ownership types may achieve safety through different behavioral pathways, with potentially different residual risks (for example, weaker discretionary hazard reporting and near-miss disclosure in more compliance-oriented, rule-bound environments, consistent with observations in the broader safety culture literature [1], [3]).

Fourth, the illustrative finding of a modest but non-trivial residual laissez-faire leadership presence, particularly if concentrated within specific supervisory layers of either ownership type, would be consistent with the well-established finding that laissez-faire leadership is uniquely destructive to safety climate [10], [11], and would suggest that leadership development interventions in Omani oil and gas organizations, regardless of ownership type, should prioritize the elimination of passive-avoidant supervisory behavior as a baseline intervention, prior to or alongside efforts to cultivate more transformational or transactional leadership specifically.

7. THEORETICAL AND PRACTICAL IMPLICATIONS

7.1 Theoretical Implications

This study, once completed with genuine field data, would contribute to the leadership-safety literature by providing one of the first direct empirical tests of ownership type as a moderator of the leadership-safety climate-safety behavior-occupational health outcome chain within a single national oil and gas industry. It would extend the applicability of the differentiated transformational-transactional leadership model [7] beyond the predominantly Western and East Asian samples in which it has previously been tested, into a Gulf Arab, Omani-specific context, and would integrate this leadership literature with the largely separate public-versus-private organizational culture literature [24], [25], a combination not previously undertaken empirically in the safety domain.

7.2 Practical Implications

For Omani oil and gas organizations, the anticipated findings would suggest several practical courses of action. Government-owned organizations may benefit from targeted transformational leadership development programs for front-line supervisors, specifically aimed at increasing discretionary safety participation and near-miss reporting, without displacing the compliance-oriented strengths of their existing transactional management approach. Private organizations, conversely, may benefit from reinforcing procedural rigor and active transactional oversight (contingent reward and constructive management-by-exception) alongside their transformational leadership strengths, to ensure that strong safety participation is matched by equally strong baseline compliance. Across both ownership types, the elimination of laissez-faire supervisory behavior through targeted coaching and performance management would represent a low-cost, high-impact intervention consistent with the broader literature on the destructiveness of passive leadership [11]. For the Ministry of Labour and other Omani regulatory bodies, the study's design and anticipated findings would support the development of ownership-sensitive occupational safety and health guidance, recognizing that a uniform, one-size-fits-all leadership development mandate may be less effective than differentiated guidance reflecting the distinct organizational cultures typically associated with government-owned and private operators.

8. LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

As with any single-country, cross-sectional survey design, the proposed study is subject to several limitations that should be considered when the completed research is eventually reported. First, common method bias is a risk whenever leadership, safety culture, safety behavior, and occupational health outcomes are all measured via employee self-report within the same questionnaire; future iterations of this research should consider supplementing self-report safety behavior and health outcome measures with objective organizational records (recordable injury rates, medical leave data) where access permits, to triangulate self-reported findings.

Second, the cross-sectional design precludes strong causal inference; although the hypothesized model specifies a directional chain from leadership to culture to behavior to outcomes, consistent with established theory [5], [7], reverse or reciprocal causal pathways (for example, poor occupational health outcomes eroding perceived leadership quality) cannot be ruled out without longitudinal data.

Third, the study is confined to a single country, and while this specificity is a strength for policy relevance within Oman, generalization to other Gulf or international oil and gas contexts should be undertaken cautiously.

Fourth, the binary government-owned/private ownership classification, while theoretically grounded [24], [25], may obscure important within-category heterogeneity, for example between fully state-owned entities and government-majority joint ventures, or between long-established multinational operators and newer private entrants; future research could usefully disaggregate ownership type further or treat it as a continuous rather than categorical moderator.

Future research should also examine longitudinal designs capable of testing genuine causal and reciprocal pathways, multi-level modeling that accounts for the nested structure of employees within work teams and supervisors, and qualitative complementary methods (interviews, focus groups) capable of illuminating the specific mechanisms through which leadership style is translated into day-to-day safety practice within Omani oil and gas organizations.

9. CONCLUSION

This paper has developed and specified an integrated conceptual model linking leadership style, safety culture and climate, employee safety behavior, and occupational health outcomes, with organizational ownership type (government-owned versus private) proposed as a key moderating variable, within the specific context of Oman's oil and gas industry.

Grounded in an extensive review of the international leadership-safety literature [1]-[23] and the public-versus-private organizational culture literature [24], [25], and informed by Gulf-regional and comparable developing-economy oil and gas safety evidence [26]-[30], the proposed comparative survey design and analytical strategy offer a rigorous and theoretically grounded means of testing whether, and how, leadership-driven safety mechanisms differ across ownership types in a single national hydrocarbon sector. Because genuine field data collection has not yet been undertaken, the results reported in Section 5 are explicitly illustrative and must be replaced with authentic empirical data before this manuscript can be considered complete or suitable for formal peer-reviewed publication.

Once completed with real data, this research is expected to make a meaningful contribution to occupational safety and health theory and practice in Oman, and to provide actionable, ownership-sensitive guidance for oil and gas operators, regulators, and policymakers seeking to strengthen safety culture and reduce occupational health risks across the sector.

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