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Structural Equation Modelling of Safety Culture Promotion among New Employees at Abu Dhabi National Oil Company

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Abstract

Strengthening safety culture has become a strategic imperative for high-risk industries, particularly in the oil and gas sector where operational failures can lead to severe human and environmental consequences. For the Abu Dhabi National Oil Company (ADNOC), fostering a strong safety culture among newly recruited employees is essential, as early behavioural formation influences long-term safety performance. Addressing this need, the present study develops and evaluates a structural model to identify key factors that promote Safety Culture among ADNOC's new employees. Data were collected from 317 newly hired operational staff using a convenience sampling method, and SmartPLS was employed to assess the fitness criteria of both the measurement and structural components of the proposed model prior to conducting hypothesis testing among the constructs. The findings show that Top Management and Esteem Needs exert the strongest positive influence on safety culture (β = 0.293), underscoring the importance of leadership, recognition, and managerial involvement. Relationship with Co-workers (β = 0.282) and Safety Awareness Practices (β = 0.250) also emerged as strong predictors, highlighting the role of teamwork and consistent safety engagement. Other variables such as Organisational Commitment to Employee Health, Availability of Health Resources, Job Safety and Work Hours, and Awareness of Safety Training Effectiveness, showed weak but positive associations. Several predictors

demonstrated small negative coefficients, such as Understanding of Awareness Safety Procedures, Wellness Program Participation, and Awareness of Potential Hazards. These results indicate potential gaps in employees' comprehension of procedures or weaknesses in how related programs are implemented. The findings also show that leadership support, peer relationships, and practical safety awareness practices are the strongest positive drivers of safety culture, while other areas may require additional organisational refinement.

Keywords: Safety Employee Health; Safety awareness; Safety working condition

1. Introduction

Promoting a strong safety culture in high-risk industries such as oil and gas is essential for preventing incidents, safeguarding employee well-being, and ensuring operational continuity. For the Abu Dhabi National Oil Company (ADNOC), new employees entering complex operational environments may lack familiarity with safety expectations, workplace hazards, and established organisational practices. Their early integration into the organisation's safety culture is therefore critical, as initial attitudes and behaviours can shape long-term safety performance. Prior research emphasises that safety culture is significantly influenced by employee health resources, hazard awareness, organisational commitment, and leadership-driven safety practices, particularly in high-risk operations (Glarcher & Vaismoradi, 2025; Leitão & Greiner, 2017).

ADNOC has implemented various safety management systems, training programmes, and behavioural interventions to strengthen its safety culture; however, evidence suggests that safety performance can vary widely depending on training effectiveness, managerial engagement, and employee perception of workplace risks. Studies within the UAE oil and gas sector show that awareness of hazard potential, quality of safety training, and clarity of procedures are crucial determinants of employees' safety behaviour and organisational safety outcomes (Almazrouei et al., 2020; Al Mazrouei, 2021). These factors become even more important for new hires who are still developing operational competence and adapting to organisational norms.

Leadership involvement and organisational safety governance further influence employees' commitment to safe practices. Research shows that supportive leadership, ethical decision-making, and clear communication enhance safety performance and cultivate a strong safety climate across ADNOC operations (Yaqoubi & Adnan, 2022; Aljneibi et al., 2022). At the same time, proactive systems such as lessons-learned mechanisms and integrated work management platforms that strengthen employees' hazard recognition and reinforce adherence to safety protocols (Saleem, 2024; Kumar et al., 2024).

Despite the presence of structured initiatives, gaps remain in understanding how new employees perceive health resources, working conditions, hazard awareness, and training effectiveness and how these factors collectively shape safety culture. Behaviour-based safety models and health promotion frameworks emphasise that the availability of health resources, employee wellness, and organisational commitment are fundamental to developing a sustainable safety culture (Flynn et al., 2018; Tetrick & Peiró, 2016). Yet empirical assessment of these relationships within ADNOC's new workforce is limited.

Safety incidents within the oil and gas sector ranging from equipment failures to hazardous exposures that highlight the importance of continuous evaluation and targeted interventions to strengthen safety performance (Tayab et al., 2024). For newly hired operational staff, inadequate training, unclear procedures, and limited experience elevate vulnerability to workplace hazards. Therefore, systematic assessment of the drivers of safety culture is essential to ensure effective onboarding and long-term organisational resilience.

This study, Structural Equation Modelling of Safety Culture Promotion among New Employees at the Abu Dhabi National Oil Company, aims to identify the organisational, behavioural, and health-related factors that most significantly influence the development of safety culture among new employees. By applying a data-driven modelling approach, the research provides insights that can inform evidence-based interventions, enhance employee well-being, and strengthen ADNOC's efforts to cultivate a proactive and sustainable safety culture.

2. Safety Culture Promotion

Safety culture promotion among new employees at the Abu Dhabi National Oil Company (ADNOC) represents a strategic and operational priority for the organisation. It encompasses a combination of organisational, behavioural, and environmental factors that collectively shape employees' safety behaviours, awareness, and engagement. Specifically, the promotion of safety culture involves four interrelated dimensions: Employee Health, Safety Awareness, Working Conditions, and Safety Culture. Each dimension plays a vital role in embedding a proactive safety mindset and reducing workplace risks, particularly among newly recruited operational staff who are less familiar with established protocols. The following sub-sections elaborate on these dimensions, highlighting their contribution to safety culture promotion within ADNOC.

2.1 Safety Employee Health

Promoting employee health is a fundamental component of ADNOC's broader safety culture, reflecting the organisation's commitment to creating a workplace in which workers are protected, supported, and empowered. A strong safety culture is closely linked with holistic health promotion practices, which include accessible health resources, institutional commitment, and employee participation in wellness initiatives. Integrating these dimensions aligns with global evidence that organisational health and safety systems significantly influence employee wellbeing and overall safety performance (Nielsen, 2014; Tetrick & Peiró, 2016).

2.1.1 Availability of Health Resources

The availability of comprehensive health resources such as on-site clinics, medical screenings, mental health support, and ergonomic facilities is central to cultivating a safety-driven health culture. Research highlights that organisations with accessible health services enable early detection of risks, support preventive care, and foster trust among employees (Flynn et al., 2018). In ADNOC's context, the provision of such resources aligns with best practices in high-risk industries, ensuring workers feel protected and equipped to maintain their wellbeing. Studies on safety culture promotion, such as the SCPIP model implemented in oil refinery settings, further emphasise that structured resources are critical in sustaining long-term health and safety behaviour change (Haghighi et al., 2017).

2.1.2 Organisational Commitment to Employee Health

Organisational leadership plays a pivotal role in embedding health into the safety culture.

Commitment is demonstrated through clear policies, leadership involvement, and consistent investment in programs that mitigate both physical and psychosocial risks. Leitão and Greiner (2017) argue that health and safety practitioners are key in bridging organisational strategy with practical implementation, ensuring that health promotion becomes an integrated routine rather than a peripheral initiative. Similarly, Glarcher and Vaismoradi (2025) highlight how specialised professionals influence the development of safety-oriented cultures by modelling safe practices and advocating for health-focused interventions. ADNOC's emphasis on preventive approaches parallels these findings, underscoring that visible management support is essential for cultivating a proactive safety environment.

2.1.3 Wellness Program Participation

Employee participation in wellness programs is a strong indicator of an organisation's safety culture maturity. Engagement in health education, physical fitness activities, mental health programmes, and lifestyle interventions not only enhances personal wellbeing but also reinforces collective safety behaviours. Evidence suggests that workplaces with high participation rates experience improved morale, reduced absenteeism, and strengthened safety compliance (Flynn et al., 2018). The Health Belief Model–based interventions studied by Haghighi et al. (2017) demonstrate that when employees perceive wellness initiatives as valuable, accessible, and supported by leadership, participation increases significantly. Within ADNOC, fostering an environment where wellness programs are encouraged and incentivised contributes to sustaining a positive and resilient safety culture.

2.2 Safety Awareness

Safety awareness is a central pillar of ADNOC's efforts to strengthen its organisational safety culture. Within high-risk oil and gas operations, awareness of training effectiveness, hazard recognition, procedural understanding, and daily safety practices collectively shape employees' capacity to prevent incidents and maintain operational excellence. Research in the UAE oil and gas sector consistently highlights that organisations with strong safety awareness frameworks demonstrate enhanced safety performance, reduced operational disruptions, and improved behavioural compliance (Almazrouei et al., 2020; Yaqoubi & Adnan, 2022).

2.2.1 Awareness of the Effectiveness of Safety Training

Effective safety training plays a vital role in improving employees' knowledge, risk perception, and adherence to safe work practices. Within ADNOC, safety training is a core component of its Integrated Work Management System (IWMS), emphasising competency-based learning and continuous improvement (Saleem, 2024). Studies show that employees' awareness of the value and outcomes of safety training reinforces their readiness to apply learned principles in real operational settings (Al Mazrouei, 2021). As highlighted by Aljneibi et al. (2022), safety-oriented organisational culture enhances employees' cognitive engagement with training, ensuring that lessons learned contribute to proactive incident prevention.

2.2.2 Awareness of Potential Hazards

Employee awareness of potential hazards ranging from process safety risks to operational, environmental, and human-factor hazards is essential in high-risk oil and gas operations. UAE-based assessments confirm that hazard recognition skills significantly influence workers' situational judgement and response behaviours (Almazrouei et al., 2020). ADNOC's initiatives, including proactive risk monitoring frameworks and enhanced incident-learning mechanisms, strengthen workers' ability to identify warning signs and respond before hazards escalate (Kumar et al., 2024). This continuous hazard-awareness reinforcement contributes to shifting ADNOC's safety approach from reactive to preventive.

2.2.3 Safety Awareness Practices

Daily safety awareness practices such as toolbox talks, stop-work authority, peer observation, and consistent communication, serve as practical mechanisms that translate policy into behaviour. Research emphasises that such practices build shared responsibility and collective vigilance within teams, supporting a strong safety culture (Tayab et al., 2024). ADNOC's adoption of structured safety routines, including safety stand-downs and cross-functional safety dialogues, fosters a culture of openness where employees collectively monitor risks and support safer work environments. These practices enhance operational resilience by ensuring that safety remains a visible and continuous priority.

2.2.4 Understanding of Awareness Safety Procedures

A clear understanding of safety procedures including emergency response protocols, permit-to-work requirements, equipment handling guidelines, and process safety standards are directly influences behavioural compliance and incident prevention. Yaqoubi and Adnan (2022) highlight that ethical leadership within ADNOC promotes transparency and accountability, ensuring that employees internalise and correctly apply these procedures. Performance scorecard initiatives have also strengthened procedural understanding by linking safety outcomes with measurable performance indicators (Almenhali, 2022). When employees fully comprehend procedural expectations, safety awareness becomes embedded in routine operations, reducing variability and enhancing consistency across ADNOC's upstream and downstream activities.

2.3 Safety Working Condition

Working conditions form a critical pillar of ADNOC's broader safety culture promotion efforts, influencing not only employee wellbeing but also operational safety performance and organisational resilience. In high-risk sectors such as oil and gas, working conditions that support safety, teamwork, security, and leadership engagement play a decisive role in shaping safe behaviours and sustaining a culture of prevention. Research across the UAE oil and gas industry underscores that positive working conditions enhance employees' psychological readiness, hazard awareness, and compliance with safety protocols (Almazrouei et al., 2020; Aljneibi et al., 2022).

2.3.1 Job Safety, Security, and Work Hours

A safe working environment, stable employment conditions, and manageable work schedules are foundational components of a strong safety culture. In ADNOC, structured systems such as the Integrated Work Management System (IWMS) strengthen job safety by enforcing standardised procedures, risk assessments, and process controls (Saleem, 2024). Ensuring job security and balanced work hours reduces fatigue-related risks, an important factor in preventing human-error incidents in complex operations. Studies within UAE oil and gas settings show that when employees perceive their jobs as secure and their workload manageable, their commitment to organisational safety expectations increases significantly (Almazrouei et al., 2020). Furthermore, proactive monitoring mechanisms and lessons-learned systems improve operational predictability, thereby reinforcing employees' perception of workplace safety (Kumar et al., 2024).

2.3.2 Relationship with Co-workers

Strong interpersonal relationships and collaborative work environments are essential for maintaining consistent safety behaviour. Effective communication, mutual trust, and peer accountability enhance situational awareness and promote collective responsibility for safety outcomes. Tayab et al. (2024) emphasise that resilience in oil and gas operations depends heavily on team cohesion and shared commitment to safe practices. In ADNOC, safety dialogues, peer observations, and cross-functional collaboration foster a supportive climate where workers feel confident to raise concerns, intervene in unsafe acts, and support each other in adhering to safety standards. These interactions strengthen ADNOC's safety culture by ensuring that safety is not seen as an individual task but as a shared organisational value.

2.3.3 Top Management & Esteem Needs

Top management involvement is a defining factor in shaping employees' sense of value, trust, and motivation to comply with safety expectations. Ethical and safety-focused leadership promotes psychological safety, reinforces policy adherence, and elevates the visibility of safety across all levels of the organisation (Yaqoubi & Adnan, 2022). ADNOC's commitment to leadership-driven safety excellence is supported by performance score cards and continuous improvement frameworks, ensures that employees feel recognised for safe behaviour and supported in their safety responsibilities (Almenhali, 2022). Aligning managerial actions with esteem needs, such as recognition, empowerment, and respect, enhances worker morale and strengthens their personal commitment to maintaining safe working conditions. Moreover, organisational frameworks that link culture, performance, and safety (Aljneibi et al., 2022) provide structured reinforcement for management's role in promoting a high-performing safety environment.

2.4 Safety Culture

Safety culture represents the collective values, behaviours, and organisational norms that determine how safety is understood, prioritised, and practiced within ADNOC's operations. In the oil and gas industry particularly within high-risk environments such as ADNOC's upstream and downstream facilities, safety culture serves as the foundation on which safe

behaviours, hazard awareness, operational discipline, and health promotion efforts are built. A strong safety culture not only reduces incidents but also drives resilience, performance excellence, and continuous improvement.

Research across global and UAE-based energy sectors consistently shows that mature safety cultures emerge when organisations integrate health promotion, effective training, leadership engagement, proactive hazard management, and employee participation (Glarcher & Vaismoradi, 2025; Leitão & Greiner, 2017; Nielsen, 2014). Within ADNOC, these elements are actively reinforced through safety programs, behaviour-based interventions, and structured safety management systems designed to shift attitudes from reactive to proactive.

A core feature of ADNOC's safety culture promotion is the emphasis on holistic wellbeing. Studies highlight that organisations that incorporate health protection and health promotion simultaneously, through accessible health resources, wellness programs, and supportive policies, experience enhanced safety outcomes and stronger workforce engagement (Flynn et al., 2018; Tetrick & Peiró, 2016). ADNOC's commitment to such integrated health–safety strategies strengthens employees' capacity to maintain focus, manage risks effectively, and respond appropriately to operational hazards.

Furthermore, evidence from UAE oil and gas operations underscores that hazard awareness, understanding of safety procedures, and the perceived effectiveness of safety training significantly influence the strength of an organisation's safety culture (Almazrouei et al., 2020; Al Mazrouei, 2021). ADNOC's use of its Integrated Work Management System (IWMS) and its lessons-learned frameworks reinforces institutional learning, operational control, and continuous improvement (Saleem, 2024; Kumar et al., 2024).

Leadership plays an equally critical role. Ethical, safety-oriented leadership has been found to enhance communication, accountability, and employees' willingness to comply with safety procedures (Yaqoubi & Adnan, 2022). In ADNOC, leadership-driven initiatives and performance scorecards align strategic priorities with frontline behaviours, further embedding safety at every organisational level (Almenhali, 2022). Interventions such as the Safety Culture Promotion Intervention Program (SCPIP) used in refinery environments demonstrate that structured leadership involvement accelerates behavioural change and strengthens safety values across teams (Haghighi et al., 2017). The safety culture within ADNOC is shaped by the integration of well-designed training, employee health promotion, strong leadership engagement, and proactive hazard management. These interconnected elements establish a safety ecosystem where workers are informed, empowered, protected, and collectively responsible for sustaining safety excellence.

3. Modelling Analysis

This modelling analysis investigates the structural relationships among safety-related factors and their influence on safety culture promotion among new employees at the Abu Dhabi National Oil Company (ADNOC). Using a data-driven approach, the study employs Structural Equation Modelling (SEM) to evaluate the strength, direction, and significance of hypothesised relationships among key constructs. Data were collected from 317 newly hired

operational staff through convenience sampling, and SmartPLS software was utilised to assess the fitness of both the measurement and structural models prior to conducting hypothesis testing. The final model, presented in Figure 1, illustrates the hypothesised paths among the constructs.

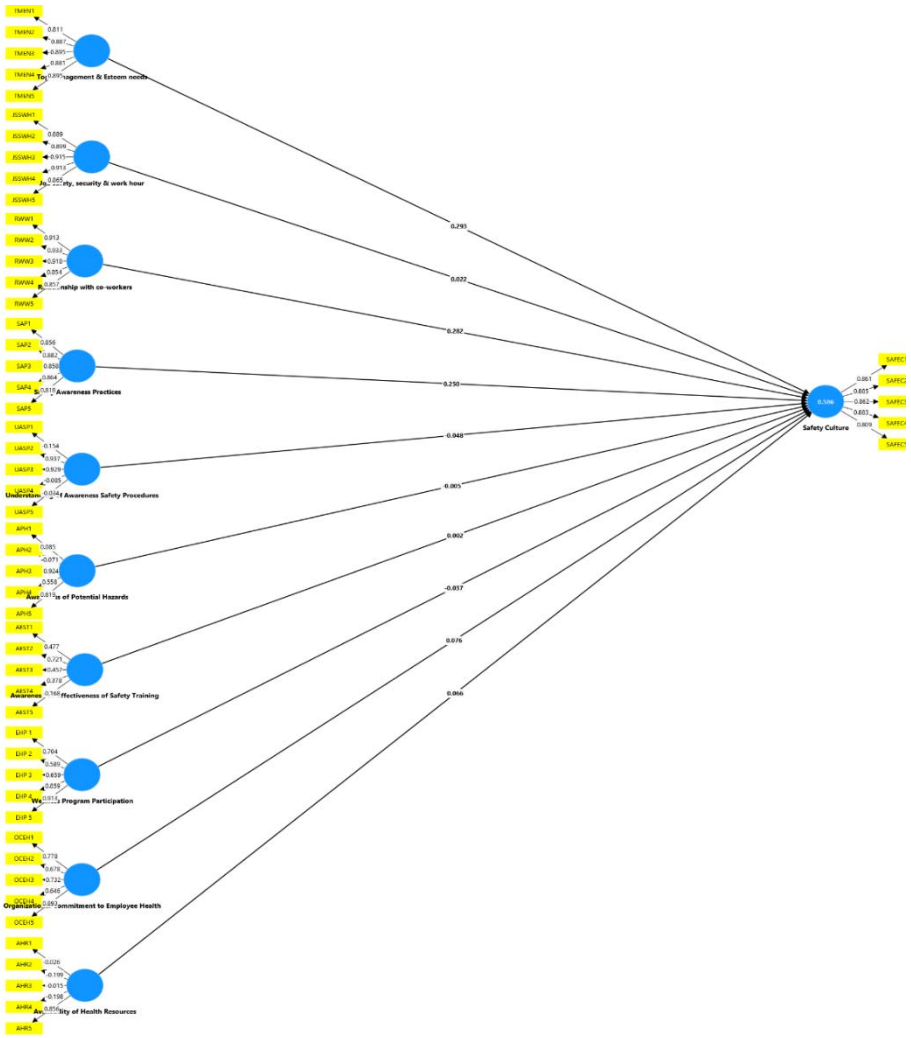

Figure 1.

Figure 1 depicts the final structural representation of safety culture promotion, comprising nine independent constructs which are *Availability of Health Resources, Awareness of the Effectiveness of Safety Training, Awareness of Potential Hazards, Job Safety, Security, and Work Hours, Organisational Commitment to Employee Health, Relationship with Co-workers, Safety Awareness Practices, Top Management & Esteem Needs, Understanding of Awareness Safety Procedures, and Wellness Program Participation* and one dependent construct, *Safety Culture*.

3.1 Assessment of Measurement Model

The measurement model was evaluated using two key criteria: construct reliability and discriminant validity, with the latter assessed based on the Fornell-Larcker criterion. Construct reliability ensures that each latent construct is measured consistently by its indicators, while discriminant validity verifies that constructs are empirically distinct from one another. The results of these assessments are presented in the following subsections.

3.1.1 Construct Reliability

Construct reliability is a crucial aspect of measurement model evaluation, ensuring that each construct consistently and accurately measures the intended concept. Table 1 presents the reliability and convergent validity statistics for the constructs in the study, including Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE).

Table 1. Construct Reliability

Construct#	**Cronbach's Alpha#**	**Composite Reliability#**	**Average Variance Extracted (AVE)#**
Availability of Health Resources#	0.776#	0.896#	0.663#
Awareness of the Effectiveness of Safety Training#	0.777#	0.869#	0.763#
Awareness of Potential Hazards#	0.770#	0.966#	0.593#
Job Safety, Security, and Work Hours#	0.939#	0.953#	0.804#
Organisational Commitment to Employee Health#	0.852#	0.864#	0.563#
Relationship with Co-workers#	0.938#	0.953#	0.802#
Safety Awareness Practices#	0.910#	0.932#	0.732#
Safety Culture#	0.912#	0.934#	0.740#
Top Management & Esteem Needs#	0.923#	0.942#	0.764#
Understanding of Awareness Safety Procedures#	0.770#	0.876#	0.766#
Wellness Program Participation#	0.855#	0.866#	0.570#

As shown in Table 1, all constructs demonstrate high internal consistency, with Cronbach's alpha values ranging from 0.770 to 0.939, exceeding the commonly accepted threshold of 0.70 (Nunnally, 1978). Similarly, composite reliability values fall between 0.864 and 0.966, indicating that the indicators reliably measure their respective constructs (Hair et al., 2019). The AVE values, ranging from 0.563 to 0.804, confirm adequate convergent validity, suggesting that each construct explains a substantial portion of the variance of its indicators (Fornell & Larcker, 1981). These reliability and validity metrics indicate that the measurement model is both reliable and valid, providing a strong foundation for the subsequent structural model analysis.

3.1.2 Discriminant Validity

Discriminant validity assesses the extent to which a construct is truly distinct from other

constructs in the model, ensuring that indicators measure their intended construct rather than overlapping with others (Fornell & Larcker, 1981). Table 2 presents the Fornell-Larcker criterion for all study constructs, where the square root of the AVE for each construct is reported on the diagonal, and the inter-construct correlations are presented off-diagonal.

Table 2. Fornell-Larcker Criterion

Constructs#	AHR#	AEST#	APH#	JSSWH#	OCEH#	RWW#	SAP#	SCP#	TMEN#	UASP#	WPP#
AHR#	0.403#	#	#	#	#	#	#	#	#	#	#
AEST#	0.009#	0.475#	#	#	#	#	#	#	#	#	#
APH#	0.837#	0.112#	0.559#	#	#	#	#	#	#	#	#
JSSWH#	0.084#	0.119#	0.076#	0.897#	#	#	#	#	#	#	#
OCEH#	0.047#	0.410#	0.090#	0.048#	0.751#	#	#	#	#	#	#
RWW#	0.047#	0.068#	0.063#	0.854#	0.564#	0.896#	#	#	#	#	#
SAP#	0.072#	0.083#	0.069#	0.810#	0.023#	0.830#	0.856#	#	#	#	#
SCP#	0.096#	0.081#	0.089#	0.698#	0.059#	0.726#	0.695#	0.860#	#	#	#
TMEN#	0.045#	0.088#	0.041#	0.878#	0.018#	0.835#	0.771#	0.713#	0.874#	#	#
UASP#	0.101#	0.060#	0.119#	0.655#	-0.036#	0.626#	0.778#	0.531#	0.652#	0.596#	#
WPP#	0.075#	0.439#	0.278#	0.059#	0.751#	0.008#	0.051#	0.048#	0.031#	0.020#	0.755#

According to the Fornell-Larcker criterion, discriminant validity is established when the square root of the AVE for each construct (diagonal values) exceeds its correlations with other constructs (off-diagonal values). As shown in Table 2, all constructs meet this criterion, indicating that each construct is empirically distinct. For instance, the AVE square root for Safety Culture (0.860) is higher than its correlations with all other constructs, confirming that this construct is measured independently and does not overlap with related variables. To facilitate interpretation of Table 2, the codes for all constructs used in the matrix are presented in Table 3, providing clarity and ease of reference for readers when examining correlations and AVE values.

Table 3. Construct Codes

Construct#	Code#
Availability of Health Resources#	AHR#
Awareness of the Effectiveness of Safety Training#	AEST#
Awareness of Potential Hazards#	APH#
Job Safety, Security, and Work Hours#	JSSWH#
Organisational Commitment to Employee Health#	OCEH#
Relationship with Co-workers#	RWW#
Safety Awareness Practices#	SAP#
Safety Culture#	SCP#
Top Management & Esteem Needs#	TMEN#
Understanding of Awareness Safety Procedures#	UASP#
Wellness Program Participation#	WPP#

These codes ensure that readers can easily match the constructs in Table 2 with their full descriptive names, enhancing comprehension of the discriminant validity results. The findings collectively provide strong evidence of discriminant validity, supporting the reliability and accuracy of the measurement model for subsequent structural analysis (Hair et al., 2019; Fornell & Larcker, 1981).

3.2 Assessment of Structural Model Quality

This section presents the evaluation of the structural model quality using two primary criteria: the coefficient of determination (R-square value) and the model fit indices. The R-square value measures the explanatory power of the model by indicating the proportion of variance in the dependent variable accounted for by the independent variables. In contrast, the model fit indices assess how well the proposed structural model corresponds with the observed data, ensuring that the relationships specified in the model are consistent with the empirical evidence. Together, these criteria provide a rigorous assessment of the model's robustness, predictive capability, and overall suitability for supporting valid and meaningful interpretations of the research findings.

3.2.1 Coefficient of Determination

The explanatory power of the structural model was evaluated using the coefficient of determination (R-square), which is widely used in Partial Least Squares Structural Equation Modelling (PLS-SEM) to assess predictive accuracy (Hair et al., 2019). Table 4 presents the R-square and adjusted R-square values for the Safety Culture construct.

Table 4. R-square Values Safety Culture Construct

Construct#	R-square#	R-square Adjusted#
Safety Culture#	0.586#	0.573#

As shown in Table 4, the R-square value of 0.586 indicates that 58.6% of the variance in Safety Culture is explained by the independent variables included in the model. According to Chin (1998), an R-square value between 0.50 and 0.75 is considered moderate to substantial, suggesting that the model demonstrates strong predictive capability. The adjusted R-square value of 0.573, which compensates for the number of predictors, further supports this interpretation by confirming that 57.3% of the variance remains valid even after statistical adjustment (Hair et al., 2021).

These values collectively indicate that the structural model is robust and that the predictors meaningfully contribute to explaining Safety Culture. This level of predictive relevance supports the model's reliability and its suitability for theoretical interpretation and practical organisational application in improving workplace safety performance (Fornell & Larcker, 1981; Hair et al., 2019).

3.2.2 Model Fit

Model fit indices are essential for determining how well a structural equation model aligns with the observed data, ensuring that the theoretical assumptions of the model are adequately reflected in its empirical performance (Hair et al., 2019). Table 5 presents the model fit statistics for both the saturated and estimated models, allowing for comparative evaluation.

Table 5. Model Fit Indices

Statistic#	Estimated Model#
SRMR#	0.006#
d_ULS#	5.263#
d_G#	1.927#
Chi-square#	1,539.161#
NFI#	0.987#

Table 5 presents the model fit indices for the estimated structural model. The SRMR value of 0.006 is well below the recommended threshold of 0.08, indicating an excellent fit between the model and the observed data (Hu & Bentler, 1999). Similarly, the d_ULS (5.263) and d_G (1.927) values suggest minimal discrepancy between the observed and model-implied covariance matrices, further supporting the model's adequacy. The Chi-square statistic of 1,539.161, although relatively high, is often sensitive to sample size, and thus should be interpreted alongside other fit indices (Kline, 2016). Finally, the NFI value of 0.987, which approaches the maximum value of 1, indicates a very good model fit, confirming that the

estimated model reliably represents the underlying data structure. Overall, these indices collectively demonstrate that the estimated model exhibits strong fit and can be confidently used for interpreting the relationships among the constructs.

3.3 Hypothesis Testing

Using the bootstrapping procedure, the strength and significance of the hypothesised relationships within the structural model were assessed to determine the extent to which the independent variables contribute to predicting the dependent variable, Safety Culture. This analysis allows for the evaluation of whether the proposed paths are statistically meaningful and supported by the data. The assessment focuses on three key outputs: the path coefficients, which indicate the direction and magnitude of the relationships; the t-statistics, which assess the reliability of the estimates; and the p-values, which confirm the level of statistical significance. The results of this evaluation are presented in Table 6.

Table 6. Path Coefficient Evaluation

Path	Path coefficient	T statistics	P values
Availability of Health Resources -> Safety Culture	0.066	0.693	0.000
Awareness OF Effectiveness of Safety Training -> Safety Culture	0.002	0.031	0.000
Awareness of Potential Hazards -> Safety Culture	-0.005	0.069	0.000
Job safety, security & work hours -> Safety Culture	0.022	0.185	0.000
Organisational Commitment to Employee Health -> Safety Culture	0.076	1.248	0.000
Relationship with co-workers -> Safety Culture	0.282	2.591	0.010
Safety Awareness Practices -> Safety Culture	0.250	2.722	0.007
Top Management & Esteem needs -> Safety Culture	0.293	3.694	0.000
Understanding of Awareness Safety Procedures -> Safety Culture	-0.048	0.630	0.000
Wellness Program Participation -> Safety Culture	-0.037	0.612	0.000

Table 6 presents the results of the path coefficient evaluation used to examine the influence of various organisational, behavioural, and safety-related factors on the development of a positive safety culture. The results show varying levels of influence across the measured variables. Among the predictors, Top Management and Esteem Needs recorded the highest positive path coefficient (0.293) with a strong and significant t-value, indicating that leadership involvement, recognition, and managerial support are the most influential contributors to improving safety culture. This is followed by Relationship with Co-workers (0.282) and Safety Awareness Practices (0.250), suggesting that cooperative working relationships and the consistent application of safety practices significantly enhance the culture of safety within the organisation.

Other variables such as Organisational Commitment to Employee Health (0.076), Availability of Health Resources (0.066), Job Safety, Security and Work Hours (0.022), and Awareness of

Effectiveness of Safety Training (0.002) demonstrated positive but weak relationships with safety culture. Although statistically significant, their low coefficient values imply that these factors play a smaller role compared to leadership support, teamwork, and awareness practices.

Interestingly, some predictors exhibited negative path coefficients, including Understanding of Awareness Safety Procedures (-0.048), Wellness Program Participation (-0.037), and Awareness of Potential Hazards (-0.005). These negative relationships, though small, may suggest possible gaps between policy and practice, lack of proper interpretation of safety procedures, or ineffective implementation of wellness and awareness initiatives. The findings indicate that while several factors contribute to shaping safety culture, the most impactful are leadership support, peer relationships, and practical safety awareness measures. The presence of negative coefficients highlights areas requiring further review to ensure alignment between organisational efforts and employees' perception and application of safety-related programs.

4. Conclusion

This study investigated the organisational, behavioural, and safety-related determinants of safety culture among newly recruited operational employees at ADNOC, using data from 317 participants analysed through a validated PLS-SEM framework. The empirical results demonstrate that leadership-related variables, particularly Top Management and Esteem Needs, are the strongest predictors of safety culture. This reinforces the importance of visible leadership commitment, recognition mechanisms, and managerial support in shaping safe behaviour from the outset of employment.

The findings further indicate that strong peer relationships and consistent safety awareness practices significantly support the development of a positive safety culture. This suggests that collaborative work environments, combined with routine reinforcement of safe practices, play an essential role in guiding employees as they adjust to organisational expectations and operational risks.

Some constructs, such as Organisational Commitment to Employee Health, Availability of Health Resources, Job Safety and Work Hours, and Awareness of Safety Training Effectiveness, demonstrated positive yet modest effects. These results suggest that the presence of safety initiatives alone is not sufficient. Their limited impact indicates the need for improved visibility, integration, and communication to ensure employees clearly understand and benefit from available support systems.

Several predictors, including Understanding of Awareness Safety Procedures, Wellness Program Participation, and Awareness of Potential Hazards, showed small negative effects. These outcomes may reflect a gap between policy intent and employee experience, insufficient programme relevance, or unclear procedural content. Future efforts should focus on improving communication, increasing programme relevance, and enhancing procedural clarity to ensure employees accurately interpret and apply safety guidance.

Hence, promoting a strong safety culture among new employees requires a balanced and targeted strategy that prioritises leadership engagement, peer influence, and practical learning.

Enhancing access to health resources, aligning safety and wellness programmes with operational realities, and improving clarity of procedural content may further strengthen safety outcomes. The findings provide actionable guidance for ADNOC and other high-risk organisations seeking to design interventions that build and sustain strong safety culture at the earliest stages of employment.

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