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Employee Perception as a Mediator Between Safety and Security Management Practices and Investigation Efficiency

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Abstract

This study examines the mediating role of employee perception in the relationship between safety and security management practices and investigation efficiency in the United Arab Emirates energy sector. The study addresses the need for efficient, fair, and learning-oriented investigations in high-risk energy organisations where safety failures, security threats, and operational disruptions can have serious legal, operational, and reputational consequences. A quantitative research design was adopted, and data were collected using a structured questionnaire distributed to employees who were directly involved in, affected by, or formally expected to cooperate with internal investigation processes. From 520 distributed questionnaires, 426 valid responses were retained after data screening and outlier removal. The proposed conceptual framework was analysed using Partial Least Squares Structural Equation Modelling. The measurement model confirmed satisfactory reliability, convergent validity, and discriminant validity for the four main constructs: Safety Management Practices, Security Management Practices, Employee Perception, and Investigation Efficiency. The structural model demonstrated strong explanatory and predictive power. Safety and security management practices explained 60.0% of the variance in employee perception, while employee perception explained 58.1% of the variance in investigation efficiency. The findings revealed that both safety and security management practices significantly influence

employee perception, with safety management practices showing the stronger effect. Employee perception also had a strong positive effect on investigation efficiency. Furthermore, mediation analysis confirmed that employee perception significantly mediates the relationships between both management practices and investigation efficiency. The study concludes that formal safety and security systems improve investigation efficiency when employees perceive them as fair, reliable, transparent, supportive, and trustworthy.

Keywords: employee perception, safety management practices, security management practices, investigation efficiency, UAE energy sector, incident investigation

1. Introduction

Efficient investigations are essential for organisational integrity, legal compliance, employee protection, stakeholder confidence, and continuous improvement. In the context of "Employee Perception as a Mediator Between Safety and Security Management Practices and Investigation Efficiency: United Arab Emirates Energy Sector," investigation efficiency is particularly important because energy-sector organisations operate in high-risk environments where safety failures, security breaches, and operational disruptions can produce serious consequences. In the UAE, incident reporting and investigation are not optional activities; they are embedded within occupational safety and health governance, labour regulation, and sector-specific compliance requirements. The Abu Dhabi Occupational Safety and Health System Framework provide requirements and guidance for occupational safety and health management, including incident notification, investigation, reporting, recording, and related governance expectations (Abu Dhabi Department of Municipalities and Transport, 2024; Abu Dhabi Public Health Center, 2024). At the federal level, the Ministry of Human Resources and Emiratisation requires employers to manage occupational safety and health risks, investigate incidents, and implement corrective and preventive measures (Ministry of Human Resources and Emiratisation, 2023). In the energy sector, these obligations are further reinforced by the Department of Energy's incident reporting regulations in Abu Dhabi (Department of Energy, 2025). These regulatory expectations increase the cost of weak investigations because poor-quality investigations can become both a safety risk and a compliance risk.

Despite this regulatory emphasis, many organisations continue to experience investigation inefficiencies. Investigations may be delayed, documentation may vary in quality, findings may remain descriptive rather than causal, and corrective actions may be implemented without generating meaningful learning. The wider incident-learning literature shows that organisations often struggle to convert incident reporting and investigation into sustained organisational learning (Guan et al., 2024; Serou et al., 2021). Effective incident response requires not only formal procedures but also fair, learning-oriented, and improvement-driven processes that encourage openness and prevent recurrence (Cribb et al., 2022; NHS England, 2022; Santos et al., 2025). This creates a practical problem for UAE energy-sector organisations: they may satisfy formal reporting requirements while still failing to achieve investigation efficiency, analytical depth, and long-term organisational learning.

A further challenge is that investigation systems may become fragmented when safety and security are managed through separate functions, tools, accountabilities, and reporting structures. However, contemporary risk environments increasingly connect occupational safety, process safety, physical security, cybersecurity, and operational resilience. Integrated approaches to safety and security are increasingly important in high-risk industries because hazards and threats often interact across technical, organisational, and human systems (Oginni et al., 2023; Zhou et al., 2021). Research on integrated safety and security management highlights the need for coordinated systems that strengthen organisational resilience and improve the management of complex risks (Marquez Tejon et al., 2023; Ylönen & Björkman, 2023). Similarly, guidance on information security and cybersecurity

risk management emphasises the importance of structured security systems and organisational preparedness (International Organization for Standardization & International Electrotechnical Commission, 2022; National Institute of Standards and Technology, 2024). In the UAE energy sector, fragmented safety and security governance can therefore lead to fragmented investigations, slower information flow, weaker coordination, and reduced learning across safety and security incidents.

Investigation outcomes also depend on the quality of information collection, interpretation, and decision-making. Incident investigations can be influenced by cognitive bias, assumptions, and incomplete evidence, which may shape what information is collected and which causal explanations become dominant. Empirical research on incident investigations shows that bias can affect the quality of investigation findings and weaken organisational learning (Thallapureddy et al., 2023). In addition, approaches that are intended to promote openness, such as "no blame" philosophies, may produce unintended consequences if they discourage deeper analysis of human, organisational, and system-level contributions to incidents (Sherratt et al., 2023). These findings suggest that investigation inefficiency is not only a procedural or technical issue. It is also a behavioural, cultural, and organisational issue.

For this reason, Employee Perception is central to understanding investigation efficiency. Investigations depend on employee cooperation, truthful disclosure, timely reporting, willingness to participate, and confidence in the investigation process. If employees perceive investigations as punitive, biased, inconsistent, or unsafe, they may remain silent, withhold information, or disengage from the process. Research on employee silence and organisational justice shows that perceptions of fairness can influence whether employees speak up or remain silent in organisational settings (Adamska, 2021). Similarly, organisational justice has been shown to affect a wide range of organisational outcomes, including employee attitudes, trust, and behavioural responses (Adamovic, 2023). Inclusive leadership and employee voice research also suggests that employees are more likely to contribute constructively when they perceive the organisational environment as fair, respectful, and supportive (Korkmaz et al., 2022; Qi et al., 2023).

Safety-related research further supports the importance of employee perception. Safety climate can influence employee behaviour by shaping how employees interpret management commitment, safety priorities, and the acceptability of speaking up about risks (Draghici et al., 2022; Sun et al., 2022). Workplace safety management practices can also influence employee attitudes and positive organisational behaviours through perceptions of support and commitment (Vu et al., 2022). In the security domain, employees' trust in organisational security practices can shape their security-related precautionary behaviour (Greulich et al., 2024). Therefore, in the context of this study, employee perception provides the psychological and behavioural pathway through which Safety Management Practices and Security Management Practices influence Investigation Efficiency.

The literature therefore signals a clear research gap. Existing studies provide valuable insights into incident learning, organisational justice, employee voice, safety climate, security

practices, and integrated safety-security management. However, limited empirical attention has been given to how Safety Management Practices and Security Management Practices jointly influence Investigation Efficiency through Employee Perception, particularly within the UAE energy sector. This gap is important because formal systems alone may not be sufficient to produce efficient investigations. Their effectiveness depends on whether employees perceive those systems as fair, reliable, transparent, protective, and worth engaging with.

Accordingly, this study addresses the gap by positioning Investigation Efficiency as an outcome shaped by timeliness, documentation quality, causal analysis, information accuracy, corrective action effectiveness, and organisational learning. It treats Employee Perception as a central mediating mechanism rather than a peripheral employee attitude. It also recognises that safety and security management practices must be understood not only as formal procedures, but also as organisational signals that shape employee trust, voice, cooperation, and willingness to participate in investigation processes. This makes the study theoretically significant and operationally urgent for UAE energy-sector organisations operating in safety-sensitive and security-sensitive environments.

2. Development of Conceptual Framework

The conceptual framework presented in Figure 1 was developed to explain the relationships among Security Management Practices (SMP), Safety Management Practices (SaMP), Employee Perception (EP), and Investigation Efficiency (IE) within the United Arab Emirates energy sector. The framework proposes that Security Management Practices and Safety Management Practices function as independent variables, Employee Perception acts as the mediating variable, and Investigation Efficiency serves as the dependent variable.

Rather than assuming that formal safety and security procedures automatically lead to efficient investigations, the framework adopts a process-oriented perspective. It argues that management practices first shape employees' perceptions of organizational reliability, fairness, transparency, protection, and support. These perceptions then influence employees' willingness to report incidents, cooperate with investigators, share accurate information, and participate in investigation-related learning. Accordingly, the framework proposes three main relationships: H1, Security Management Practices positively influence Employee Perception; H2, Safety Management Practices positively influence Employee Perception; and H3, Employee Perception positively influences Investigation Efficiency.

The development of the framework followed a structured conceptual synthesis process. First, the UAE energy sector was examined as the empirical context of the study because it represents a high-risk, highly regulated, and strategically important industry. In this sector, safety failures, security breaches, and weak incident investigations can have serious consequences for employees, infrastructure, business continuity, environmental protection, and national resilience. Second, relevant regulatory and institutional sources were reviewed to identify the practical requirements placed on organizations operating in this sector. National and emirate-level frameworks, including the Abu Dhabi Occupational Safety and Health System Framework, OSHAD-related guidance, UAE labour safety regulations, and

Abu Dhabi Department of Energy incident-reporting requirements, emphasize the importance of structured systems for risk control, occupational safety, reporting, accountability, and incident management (Abu Dhabi Department of Municipalities and Transport, 2024; Abu Dhabi Public Health Center, 2024; Department of Energy, 2025; Ministry of Human Resources and Emiratisation, 2023). These sources justify the inclusion of safety and security management practices as core organizational constructs in the framework.

Third, the academic literature was synthesized to identify constructs that are theoretically relevant, empirically supported, and suitable for explaining investigation-related outcomes. The literature was organized around four interrelated themes: safety management and safety climate, security governance and organizational resilience, employee perception and behavioural response, and incident investigation and organizational learning. This synthesis showed that investigation efficiency is not determined solely by the existence of policies, procedures, or controls. Instead, it depends on how those systems are implemented, how employees interpret them, and whether employees trust the organization enough to participate openly in reporting and investigation processes. This finding provided the basis for positioning Employee Perception as the mediating mechanism between formal management practices and Investigation Efficiency.

Security Management Practices were selected as an independent variable because security systems are essential in the energy sector, where organizations must protect employees, facilities, operational assets, information, and critical infrastructure from internal and external threats. Security management is increasingly understood as part of organizational resilience, particularly in environments where physical security, cyber security, operational continuity, and emergency preparedness are interconnected (Marquez Tejon et al., 2023; National Institute of Standards and Technology, 2024; Zhang et al., 2024). The inclusion of this construct is therefore justified not only by regulatory relevance, but also by its strategic role in maintaining trust, continuity, preparedness, and organizational protection. However, the framework recognizes that security practices influence investigation efficiency through employees' perceptions. When employees perceive security practices as credible, fair, protective, and consistently applied, they are more likely to trust organizational systems and cooperate with investigation processes. Studies on security attitudes and precautionary behaviour support this view by showing that employees' trust in security systems can influence how they respond to security-related expectations and organizational controls (Greulich et al., 2024).

Safety Management Practices were also selected as an independent variable because safety systems are central to risk prevention, incident reporting, hazard control, training, communication, and emergency response in high-risk industries. The literature consistently shows that safety management practices contribute to the development of a positive safety climate and encourage safe employee behaviour (Draghici et al., 2022; Vu et al., 2022). In the context of incident investigations, safety practices are especially important because they influence whether employees feel encouraged to report unsafe conditions, disclose errors, cooperate with investigators, and participate in corrective actions. Prior studies suggest that effective safety systems can strengthen perceptions of organizational support, trust, and

commitment, which may in turn affect reporting behaviour and participation in learning processes (Sun et al., 2022; Zhang et al., 2023). The inclusion of Safety Management Practices is therefore justified by both its preventive role and its potential contribution to post-incident investigation quality.

Employee Perception was selected as the mediating variable because formal safety and security systems operate through employees' interpretations of those systems. Employees do not respond only to written procedures, policies, or controls; they respond to how they experience those practices in daily work. A technically sound safety or security system may fail to support investigation efficiency if employees perceive it as punitive, inconsistent, unclear, biased, or disconnected from operational realities. Conversely, when employees perceive organizational practices as fair, transparent, reliable, and supportive, they are more likely to trust management, report incidents accurately, share relevant information, and cooperate during investigations. This mediating role is supported by research on organizational justice, psychological safety, employee voice, and inclusive work climates, all of which emphasize that employee behaviour is shaped by perceptions of fairness, trust, and openness within the organization (Adamovic, 2023; Adamska, 2021; Korkmaz et al., 2022; Qi et al., 2023). Employee Perception is therefore not treated as a secondary attitudinal outcome, but as the psychological and behavioural pathway through which management practices influence investigation efficiency.

Investigation Efficiency was selected as the dependent variable because the study focuses on the organization's ability to conduct timely, accurate, objective, and learning-oriented investigations following safety or security incidents. Efficient investigations require more than procedural compliance. They depend on accurate information, timely reporting, employee cooperation, unbiased analysis, effective communication between departments, and the organization's ability to convert findings into corrective and preventive actions. Literature on incident learning and high-reliability organizations emphasizes that effective investigations require a just culture, reliable reporting systems, systematic analysis, and organizational learning mechanisms (Cribb et al., 2022; Guan et al., 2024; Patterson et al., 2024; Serou et al., 2021; Sherratt et al., 2023; Thallapureddy et al., 2023). This supports the view that investigation efficiency is both a procedural and behavioural outcome.

The resulting framework therefore proposes that Security Management Practices positively influence Employee Perception (**H1**) and that Safety Management Practices positively influence Employee Perception (**H2**). Employee Perception is then expected to positively influence Investigation Efficiency (**H3**). The framework further suggests that the contribution of safety and security management practices to investigation efficiency is indirect, operating through employees' perceptions of organizational safety, security, fairness, trust, transparency, and support. This mediating logic is especially relevant in the UAE energy sector, where incident investigations often rely on employee participation, accurate reporting, timely communication, and confidence in organizational systems.

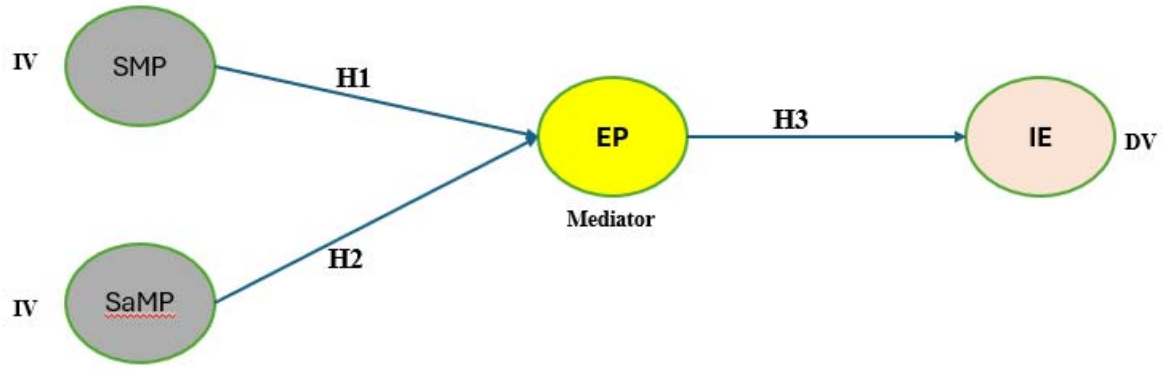

Figure 1. Conceptual framework of the relationship between safety management practices, security management practices, employee perception, and investigation efficiency

Based on the framework, the following hypotheses may be developed:

H1: Security Management Practices have a positive significant effect on Employee Perception.

H2: Safety Management Practices have a positive significant effect on Employee Perception.

H3: Employee Perception has a positive significant effect on Investigation Efficiency.

H4: Employee Perception mediates the relationship between Security Management Practices and Investigation Efficiency.

H5: Employee Perception mediates the relationship between Safety Management Practices and Investigation Efficiency.

The framework provides a critical explanation of how investigation efficiency may be achieved in the UAE energy sector. It does not treat safety and security as isolated technical functions, but as interconnected organizational practices that influence investigation outcomes through employee experience and behaviour. This is important because organizations may comply with regulatory requirements without necessarily achieving effective investigations. By including Employee Perception as a mediator, the framework recognizes that efficient investigations depend not only on policies, procedures, and controls, but also on trust, openness, reporting culture, employee cooperation, and organizational learning. Therefore, the proposed framework offers a contextually grounded and theoretically supported model for examining how safety and security management practices contribute to investigation efficiency in the UAE energy sector.

3. Methodology

This study was conducted among employees of a UAE energy-sector organisation who were directly involved in, affected by, or formally expected to cooperate with internal investigation processes. The target population included employees whose roles were connected to safety,

security, operational risk, compliance, emergency response, asset integrity, and investigation-related decision-making.

A proportionate stratified sampling approach was adopted to ensure adequate representation across the major organisational functions relevant to the study. These functions included health, safety, and environment; security and cybersecurity; operations and maintenance; line management; risk and compliance; asset integrity; emergency response; and middle or senior management. This sampling approach was appropriate because it allowed the study to capture views from different employee groups that may experience safety practices, security practices, and investigation processes in different ways.

Data were collected using a structured questionnaire designed to measure the main constructs of the study: Safety Management Practices, Security Management Practices, Employee Perception, and Investigation Efficiency. A total of 520 questionnaires were distributed, of which 483 were returned. After removing incomplete responses, 441 complete questionnaires remained. Further screening was then conducted to identify and remove outliers, resulting in 426 valid responses for final analysis.

The collected data were used to model the proposed conceptual framework. Partial Least Squares Structural Equation Modelling was employed to assess the validity of the measurement model and to examine the relationships among the constructs. This approach enabled the study to evaluate both the direct effects of Safety Management Practices and Security Management Practices on Employee Perception, and the mediating role of Employee Perception in the relationship between management practices and Investigation Efficiency.

4. Modelling of the Framework

The conceptual framework was modelled using Partial Least Squares Structural Equation Modelling. The purpose of the modelling process was to determine how organisational safety and security management practices influence investigation efficiency, with specific emphasis on the mediating role of employee perception.

PLS-SEM was considered appropriate for this study because the framework involves multiple latent constructs, direct relationships, and mediation effects. It is also suitable for predictive models that aim to explain variance in key outcome variables, such as Employee Perception and Investigation Efficiency (Hair et al., 2022; Hair & Alamer, 2022; Ringle et al., 2023).

Following standard PLS-SEM procedures, the analysis was conducted in two main stages. The first stage involved assessing the measurement model to establish the reliability and validity of the constructs. This included examining internal consistency reliability, convergent validity, and discriminant validity. The second stage involved assessing the structural model to test the hypothesised relationships among the constructs, including the direct effects and the mediating role of Employee Perception (Hair et al., 2022; Hair et al., 2026).

Through this modelling process, the study evaluated whether Safety Management Practices and Security Management Practices significantly shape Employee Perception, and whether Employee Perception subsequently improves Investigation Efficiency within the UAE

energy-sector context.

4.1 Measurement Model Assessment

Before testing the relationships between management practices, perception, and efficiency, the measurement model was assessed to ensure the reliability and validity of the constructs. Reliability and validity assessment is essential in survey-based research because latent constructs must be measured consistently and accurately before structural relationships can be interpreted (DeVellis & Thorpe, 2022; Goodfellow, 2023).

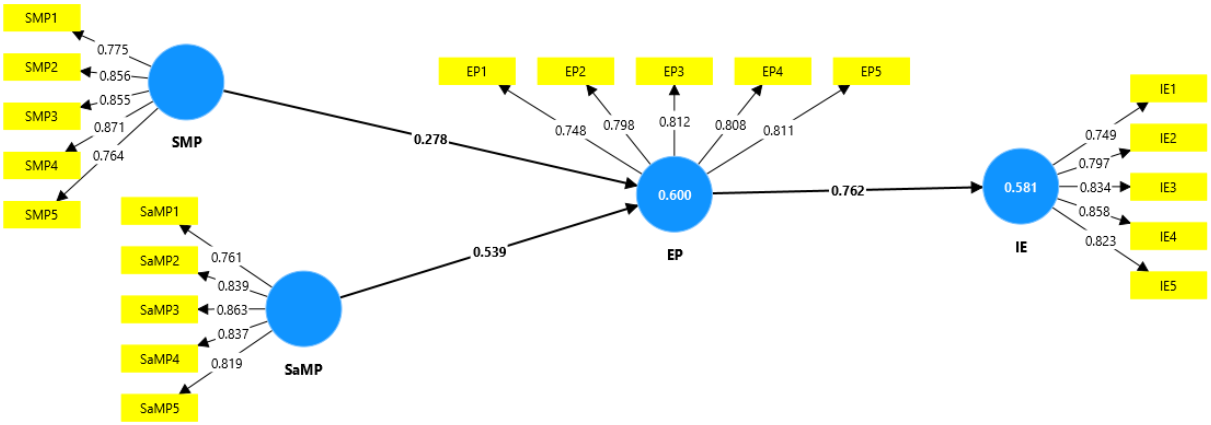

Figure 2. Model after PLA algorithm procedure

As shown in Table 1, internal consistency was established. Cronbach's Alpha and Composite Reliability values for all core constructs, Employee Perception, Investigation Efficiency, Security Management Practices, and Safety Management Practices, were above the recommended threshold of 0.70, indicating satisfactory reliability (DeVellis & Thorpe, 2022; Hair et al., 2022). Convergent validity was also confirmed, as the Average Variance Extracted values for all constructs exceeded the 0.50 threshold, indicating that the constructs capture more than half of the variance of their respective indicators (Hair et al., 2022; Hair & Alamer, 2022).

Table 1. Construct reliability and validity

Construct	Code	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
Employee Perception	EP	0.855	0.896	0.633
Investigation Efficiency	IE	0.872	0.907	0.661
Security Management Practices	SMP	0.882	0.914	0.681
Safety Management Practices	SaMP	0.882	0.914	0.680

Discriminant validity was assessed to ensure that safety practices, security practices, perception, and efficiency are empirically distinct concepts. The Heterotrait-Monotrait ratio is commonly used in PLS-SEM to assess whether constructs are sufficiently distinct from one another (Hair et al., 2022; Hair & Alamer, 2022).

Table 2. HTMT results

	EP	IE	SMP	SaMP
EP				
IE	0.872			
SMP	0.797	0.772		
SaMP	0.859	0.848	0.879	

As shown in Table 2, the HTMT values ranged from 0.772 to 0.879. Although some values exceed the stricter 0.85 criterion, all values remain below the more liberal 0.90 threshold, which is often considered acceptable when constructs are conceptually related. This is particularly relevant because safety and security management practices are closely connected in high-risk and energy-sector environments, where integrated approaches to safety, security, and resilience are increasingly emphasized (Marquez Tejon et al., 2023; Ylönen & Björkman, 2023; Zhang et al., 2024).

Table 3. Fornell-Larcker criterion

	EP	IE	SMP	SaMP
EP	0.796			
IE	0.762	0.813		
SMP	0.695	0.677	0.825	
SaMP	0.754	0.748	0.773	0.825

Furthermore, Table 3 shows that the square root of the AVE for each construct, represented by the diagonal values, is greater than its highest correlation with any other construct. This satisfies the Fornell-Larcker criterion and provides further evidence of discriminant validity (Hair et al., 2022; Ringle et al., 2023). Collectively, these results confirm that the survey instruments effectively and distinctly measured the study's four central variables.

4.2 Structural Model Assessment

Following the validation of the measurement model, the structural model was evaluated to understand the predictive power of the framework. In PLS-SEM, structural model assessment typically includes examining collinearity, explanatory power, effect sizes, and the significance of hypothesized paths (Hair et al., 2022; Hair & Alamer, 2022).

First, potential collinearity issues among the independent variables were checked. As presented in Table 4, all Variance Inflation Factor values ranged between 1.000 and 2.480, which is below the commonly recommended threshold of 3.0. This indicates that there is no critical collinearity between Safety Management Practices and Security Management Practices (Hair et al., 2022).

Table 4. Inner VIF values

Path	VIF
EP -> IE	1.000
SMP -> EP	2.480
SaMP -> EP	2.480

The explanatory power of the model was assessed through the coefficient of determination, R-square. According to Table 5, the combined implementation of safety and security management practices explains 60.0% of the variance in Employee Perception. In turn, the overall framework explains 58.1% of the variance in Investigation Efficiency. These results indicate that the model has substantial explanatory power, particularly in predicting employee perception and investigation efficiency within an organizational safety and security context (Hair et al., 2022; Ringle et al., 2023).

Table 5. R-square values

Endogenous Construct	R-square	Adjusted R-square
EP	0.600	0.598
IE	0.581	0.580

To understand the specific contributions of the variables, effect sizes were evaluated using f-square values. As shown in Table 6, Employee Perception exerts a very large effect on Investigation Efficiency. This finding is consistent with prior literature emphasizing that employee perceptions, safety climate, psychological safety, organizational justice, and employee voice can significantly influence organizational outcomes and incident-related processes (Adamovic, 2023; Draghici et al., 2022; Qi et al., 2023; Sun et al., 2022).

Additionally, Safety Management Practices demonstrate a robust effect on Employee Perception, while Security Management Practices exert a smaller but meaningful effect. This aligns with studies showing that safety management systems, safety climate, and security-related practices shape employee attitudes, behavior, and organizational reliability (Greulich et al., 2024; Vu et al., 2022; Ylönen & Björkman, 2023).

Table 6. f-square values

Construct	EP	IE
EP	N/A	1.385
IE	N/A	N/A
SMP	0.078	N/A
SaMP	0.293	N/A

In addition to assessing the explanatory power of the model through R-square values, predictive relevance was examined using cross-validated redundancy and cross-validated communality values. In PLS-SEM, Q^2 values greater than zero indicate that the model has predictive relevance for a particular construct, while higher values suggest stronger predictive capability (Hair et al., 2022; Hair & Alamer, 2022; Ringle et al., 2023).

The cross-validated redundancy results are presented in Table 7. These values assess the model's ability to predict the endogenous constructs by considering both the measurement model and the structural model. The results show that Employee Perception has a Q^2 value of 0.365, while Investigation Efficiency has a Q^2 value of 0.370. Since both values are greater than zero, the model demonstrates strong predictive relevance for the two endogenous constructs. This indicates that Safety Management Practices and Security Management Practices are useful in predicting Employee Perception, and that Employee Perception is useful in predicting Investigation Efficiency.

The Q^2 values for Security Management Practices and Safety Management Practices are 0.000 in the cross-validated redundancy results. This is expected because these constructs are exogenous variables in the model and are not predicted by other constructs. Therefore, the zero values should not be interpreted as poor predictive relevance, but rather as a reflection of their role as independent predictor constructs in the structural model.

Table 7. Cross-validated redundancy values

Construct	SSO	SSE	Q^2 (= 1 - SSE/SSO)
EP	1990.000	1263.951	0.365
IE	1990.000	1252.830	0.370
SMP	1990.000	1990.000	0.000
SaMP	1990.000	1990.000	0.000

The cross-validated communality results are shown in Table 8. Unlike cross-validated redundancy, cross-validated communality focuses mainly on the predictive quality of the measurement model. The Q^2 values for all constructs are positive, ranging from 0.444 to 0.517. This confirms that the measurement model has strong predictive relevance across all constructs.

Employee Perception recorded a Q^2 value of 0.444, while Investigation Efficiency recorded a Q^2 value of 0.485. These results indicate that the indicators of both endogenous constructs have strong predictive accuracy. Similarly, Security Management Practices and Safety Management Practices recorded Q^2 values of 0.517 and 0.514, respectively, suggesting that the indicators used to measure the two management practice constructs are highly relevant and reliable for prediction.

Table 8. Cross-validated communality values

Construct	SSO	SSE	Q^2 (= 1 - SSE/SSO)
EP	1990.000	1107.074	0.444
IE	1990.000	1023.994	0.485
SMP	1990.000	960.466	0.517
SaMP	1990.000	967.640	0.514

Overall, the predictive relevance results provide further support for the robustness of the proposed framework. The cross-validated redundancy values confirm that the structural model has strong predictive relevance for Employee Perception and Investigation Efficiency. Meanwhile, the cross-validated communality values confirm that the measurement model demonstrates strong predictive quality across all four constructs. These findings strengthen the conclusion that safety and security management practices, through employee perception, provide a meaningful basis for predicting investigation efficiency in the UAE energy sector.

4.3 Path Assessment and Hypothesis Testing

To test the direct hypotheses of the study framework, a bootstrapping procedure was performed to obtain path coefficients, t-statistics, and p-values.

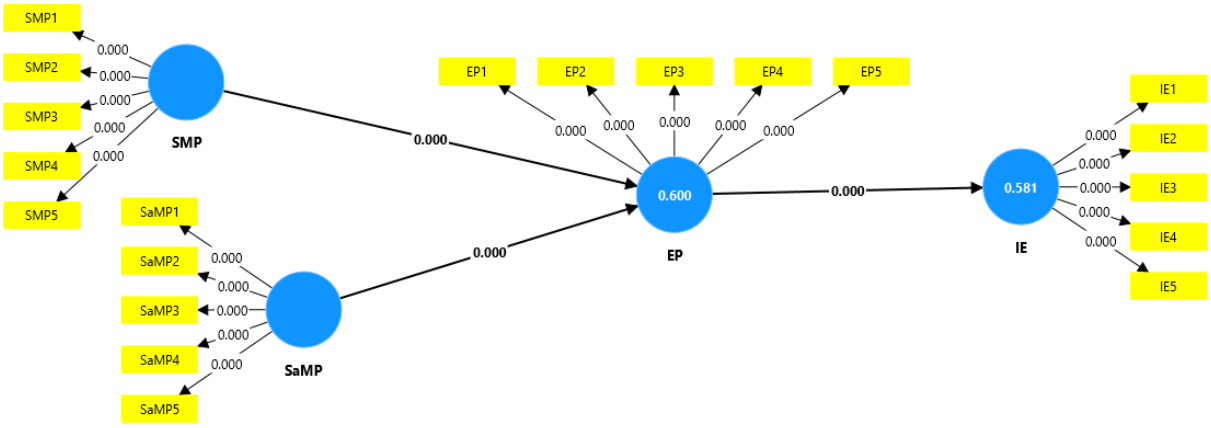

Figure 3. Model after bootstrapping procedure

As shown in Table 9, all three direct relationships were statistically significant at **p < 0.001**, confirming support for **H1, H2, and H3** (Hair et al., 2022; Hair & Alamer, 2022). H1 proposed that Security Management Practices have a positive significant effect on Employee Perception. The results support this hypothesis, as Security Management Practices had a positive and significant effect on Employee Perception (β = 0.278, t = 3.582, p = 0.000). This indicates that well-implemented security practices, such as protective systems, security procedures, and organisational preparedness, positively shape how employees perceive their work environment.

H2 proposed that Safety Management Practices have a positive significant effect on Employee Perception. This hypothesis was also supported. Safety Management Practices had a stronger positive effect on Employee Perception (β = 0.539, t = 7.287, p = 0.000) than Security Management Practices. This suggests that safety-related policies, procedures, training, reporting systems, and management commitment play a major role in shaping employees' perceptions of organisational care, fairness, and protection.

H3 proposed that Employee Perception has a positive significant effect on Investigation Efficiency. The results strongly support this hypothesis, as Employee Perception had a positive and highly significant effect on Investigation Efficiency (β = 0.762, t = 19.560, p = 0.000). This indicates that when employees perceive safety and security systems as reliable, fair, transparent, and supportive, investigation processes are more likely to be efficient, cooperative, accurate, and learning-oriented.

Table 9. Direct relationships and hypothesis testing

Hypothesis	Direct Path	Path strength	T-statistics	P-values	Decision
H1	SMP → EP	0.278	3.582	0.000	Supported
H2	SaMP → EP	0.539	7.287	0.000	Supported
H3	EP → IE	0.762	19.560	0.000	Supported

These findings confirm the foundational links of the model. Both Safety Management Practices and Security Management Practices significantly shape Employee Perception, while Employee Perception directly and strongly improves Investigation Efficiency. The results are consistent with previous research suggesting that organisational safety systems, security structures, leadership practices, safety climate, trust, voice, and perceptions of fairness influence employee behaviour and incident-related outcomes (Adamska, 2021; Cribb et al., 2022; Draghici et al., 2022; Greulich et al., 2024; Guan et al., 2024; Patterson et al., 2024; Sherratt et al., 2023; Sun et al., 2022; Vu et al., 2022).

4.4 Mediating Assessment

The central objective of this study was to determine whether Employee Perception serves as a mediator between organisational management practices and Investigation Efficiency. Mediation analysis is useful because it explains how and why independent variables influence

an outcome variable through an intervening mechanism (Hair et al., 2022; Hair et al., 2026). In this study, the mediation assessment tested H4 and H5.

H4 proposed that Employee Perception mediates the relationship between Security Management Practices and Investigation Efficiency. As shown in Table 10, the indirect path from Security Management Practices to Investigation Efficiency through Employee Perception was positive and statistically significant ($\beta = 0.212$, $t = 3.484$, $p = 0.000$). Therefore, H4 is supported. This result indicates that Security Management Practices improve Investigation Efficiency partly by shaping positive employee perceptions of organisational preparedness, fairness, protection, and trust.

H5 proposed that Employee Perception mediates the relationship between Safety Management Practices and Investigation Efficiency. The results also support this hypothesis, as the indirect path from Safety Management Practices to Investigation Efficiency through Employee Perception was positive and statistically significant ($\beta = 0.411$, $t = 6.405$, $p = 0.000$). Therefore, H5 is supported. This finding suggests that Safety Management Practices improve Investigation Efficiency by strengthening employees' perceptions of safety commitment, transparency, support, and fairness.

Table 10. Indirect relationships and hypothesis testing

Hypothesis	Indirect Path	Original Sample	T-statistics	P-values	Decision
H4	SMP → EP → IE	0.212	3.484	0.000	Supported
H5	SaMP → EP → IE	0.411	6.405	0.000	Supported

The mediation results reveal that organisational practices do not influence investigation outcomes in isolation. Rather, their effect on Investigation Efficiency operates through the way employees perceive and experience these practices. Specifically, Security Management Practices enhance Investigation Efficiency when employees view security systems as reliable, protective, and trustworthy. Similarly, Safety Management Practices contribute more strongly to Investigation Efficiency when employees perceive safety systems as consistent, fair, supportive, and improvement-oriented.

The stronger indirect effect for **H5** compared with **H4** suggests that Safety Management Practices have a greater influence on Investigation Efficiency through Employee Perception than Security Management Practices. This may be because safety practices are often more visible to employees in their daily work activities, including safety training, incident reporting, hazard control, emergency drills, risk assessments, and management commitment to worker protection.

These findings are consistent with previous studies showing that safety climate, psychological safety, organisational justice, and employee voice can act as mechanisms through which management practices influence employee behaviour and organisational outcomes (Adamovic, 2023; Draghici et al., 2022; Qi et al., 2023; Sun et al., 2022). They also

support the broader incident-learning literature, which emphasizes that effective incident reporting, investigation, and learning depend on organisational culture, just practices, information flow, and employee willingness to participate in improvement processes (Cribb et al., 2022; Guan et al., 2024; NHS England, 2022; Santos et al., 2025; Serou et al., 2021; Zhang et al., 2023).

In the context of the UAE energy sector, these findings are particularly relevant because safety, security, and incident-reporting practices are embedded within formal regulatory and governance frameworks (Abu Dhabi Department of Municipalities and Transport, 2024; Abu Dhabi Public Health Center, 2024; Department of Energy, 2025; Ministry of Human Resources and Emiratisation, 2023). However, the results suggest that regulatory compliance alone may not be sufficient to improve investigation efficiency. Organisations must also ensure that safety and security practices are understood, trusted, and positively perceived by employees. Thus, the mediation results empirically validate the conceptual framework by confirming that Employee Perception is the key pathway through which Safety and Security Management Practices enhance Investigation Efficiency.

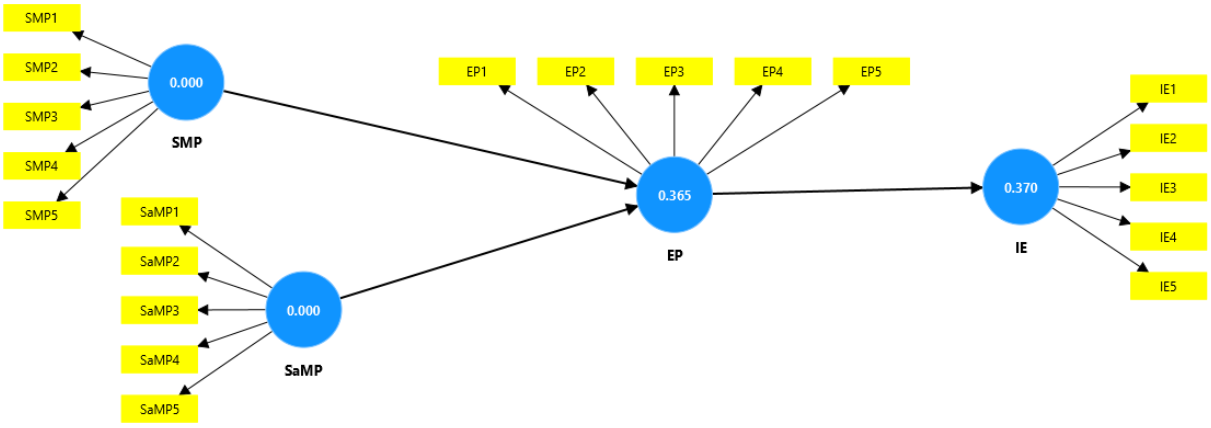

Figure 4. Model after blindfolding procedure

5. Discussion of the Findings

The findings of this study provide strong empirical support for the proposed conceptual framework, which examined Employee Perception as a Mediator Between Safety and Security Management Practices and Investigation Efficiency in the United Arab Emirates Energy Sector. Overall, the results show that safety and security management practices are important organisational mechanisms that shape employee perception, and that employee perception subsequently improves investigation efficiency. This supports the central argument of the study: efficient investigations are not achieved through formal procedures alone, but also through the extent to which employees trust, understand, and engage with those procedures.

The measurement model results confirmed that the constructs used in the study were reliable and valid. The Cronbach's Alpha and Composite Reliability values for Employee Perception, Investigation Efficiency, Security Management Practices, and Safety Management Practices were all above the recommended threshold of 0.70. Similarly, the Average Variance Extracted values exceeded 0.50, confirming convergent validity. These findings indicate that the measurement items were internally consistent and adequately captured the intended constructs. This is important because the study relies on latent constructs that cannot be directly observed, but must be measured through reliable and valid indicators. The results are therefore consistent with methodological guidance on scale development and PLS-SEM, which emphasises the need to establish reliability and validity before interpreting structural relationships (DeVellis & Thorpe, 2022; Hair et al., 2022; Hair & Alamer, 2022).

The discriminant validity results also supported the adequacy of the measurement model. The Fornell-Larcker criterion confirmed that each construct shared more variance with its own indicators than with other constructs. The HTMT values were also below the more liberal threshold of 0.90, although some values exceeded the stricter 0.85 threshold. This suggests that the constructs are empirically distinct, but conceptually related. This is understandable in the UAE energy-sector context, where safety and security management practices often overlap in practice. Modern high-risk industries increasingly require integrated approaches to safety, security, cybersecurity, resilience, and operational continuity (Marquez Tejon et al., 2023; Oginni et al., 2023; Ylönen & Björkman, 2023; Zhang et al., 2024; Zhou et al., 2021). Therefore, the relatively high association between Safety Management Practices and Security Management Practices reflects the practical reality that both domains contribute to organisational risk management and incident prevention.

The structural model findings further strengthen the proposed framework. Safety Management Practices and Security Management Practices jointly explained 60.0% of the variance in Employee Perception. This indicates that employees' perceptions are strongly influenced by the quality, consistency, and visibility of organisational safety and security systems. In practical terms, employees are more likely to form positive perceptions when they observe effective safety procedures, visible management commitment, reliable security controls, transparent reporting systems, and consistent risk-management practices. This finding is consistent with previous research showing that safety climate, safety management systems, perceived organisational support, and trust in security practices influence employee attitudes and behaviour (Draghici et al., 2022; Greulich et al., 2024; Sun et al., 2022; Vu et al., 2022).

The model also explained 58.1% of the variance in Investigation Efficiency. This is an important finding because it shows that Employee Perception is a strong explanatory factor in determining whether investigations are timely, accurate, cooperative, and learning-oriented. The large f-square value for the path from Employee Perception to Investigation Efficiency further confirms that Employee Perception is the strongest driver in the model. This suggests that investigation efficiency depends not only on formal investigation procedures, but also on employee trust, willingness to disclose information, openness during interviews, and confidence in the fairness of the process. This aligns with studies emphasising that incident

investigation and organisational learning are strengthened when organisations create fair, just, and participatory environments (Cribb et al., 2022; Guan et al., 2024; Patterson et al., 2024; Serou et al., 2021; Sherratt et al., 2023).

The direct path results provide evidence for the acceptance of H1, H2, and H3. H1, which proposed that Security Management Practices have a positive significant effect on Employee Perception, was supported. The results showed that Security Management Practices significantly influenced Employee Perception. This means that when employees perceive security systems as reliable, protective, and well managed, their perception of the organisation improves. This finding is especially relevant in the energy sector, where security risks may include physical threats, cybersecurity incidents, asset protection concerns, and operational disruptions. It is also consistent with research showing that trust in organisational security practices can influence employees' security-related attitudes and precautionary behaviour (Greulich et al., 2024), as well as with frameworks that emphasise structured cybersecurity and information security management (International Organization for Standardization & International Electrotechnical Commission, 2022; National Institute of Standards and Technology, 2024).

H2, which proposed that Safety Management Practices have a positive significant effect on Employee Perception, was also supported. The effect of Safety Management Practices on Employee Perception was stronger than that of Security Management Practices. This suggests that safety practices may be more visible and immediate to employees in their daily work experience. In energy-sector organisations, employees frequently interact with safety procedures, risk assessments, toolbox talks, training, permit-to-work systems, emergency drills, and incident reporting processes. As a result, strong safety management practices may create a more direct sense of organisational care, protection, and support. This finding is consistent with prior studies indicating that safety leadership, safety climate, and workplace safety management practices influence employee behaviour, psychological safety, safety voice, and organisational commitment (Draghici et al., 2022; Sun et al., 2022; Vu et al., 2022).

H3, which proposed that Employee Perception has a positive significant effect on Investigation Efficiency, was strongly supported. This is one of the most important findings of the study because it confirms that employees' interpretation of safety and security systems directly affects investigation outcomes. If employees perceive investigation processes as fair, transparent, non-punitive, and improvement-oriented, they are more likely to provide accurate information, cooperate with investigators, report hazards, and support corrective actions. Conversely, if they perceive the process as punitive, biased, or inconsistent, they may remain silent or provide incomplete information. This supports the literature on organisational justice and employee silence, which shows that perceptions of fairness influence whether employees speak up or withhold information (Adamovic, 2023; Adamska, 2021). It also supports research on employee voice and inclusive leadership, which indicates that employees contribute more openly when they feel respected, included, and psychologically safe (Korkmaz et al., 2022; Qi et al., 2023).

The mediation findings provide the strongest support for the conceptual framework. H4, which proposed that Employee Perception mediates the relationship between Security Management Practices and Investigation Efficiency, was supported. This means that security practices improve investigation efficiency partly because they shape how employees perceive the organisation's preparedness, fairness, and protective capacity. In other words, security systems are more likely to support efficient investigations when employees trust them and view them as legitimate. This is particularly important in the UAE energy sector, where security incidents may involve sensitive information, operational assets, cybersecurity issues, or regulatory reporting obligations. The finding suggests that security management should not be treated only as a technical or compliance function, but also as a trust-building organisational practice.

H5, which proposed that Employee Perception mediates the relationship between Safety Management Practices and Investigation Efficiency, was also supported. The indirect effect of Safety Management Practices on Investigation Efficiency through Employee Perception was stronger than the indirect effect of Security Management Practices. This indicates that safety practices have a particularly strong influence on investigation efficiency through employee perception. The finding suggests that safety systems improve investigations not only by preventing incidents or defining procedures, but also by shaping employees' willingness to report, participate, and learn. When safety management practices are perceived as consistent, fair, and supportive, employees are more likely to engage honestly with investigation processes. This finding aligns with research showing that safety climate and psychological safety can influence safety voice and safety-related behaviour (Draghici et al., 2022; Sun et al., 2022), and with incident-learning literature highlighting the importance of openness, learning, and just responses to incidents (Cribb et al., 2022; Guan et al., 2024; Serou et al., 2021).

The predictive relevance results further confirm the robustness of the model. The cross-validated redundancy values for Employee Perception and Investigation Efficiency were greater than zero, indicating that the structural model has predictive relevance for the two endogenous constructs. In addition, the cross-validated communality values for all constructs were positive, showing that the measurement model has strong predictive quality. These findings suggest that the model is not only statistically significant, but also useful for predicting key organisational outcomes. In practical terms, the framework can help UAE energy-sector organisations understand how improvements in safety and security practices may strengthen employee perception and, in turn, improve investigation efficiency.

From a regulatory perspective, the findings are highly relevant. UAE energy-sector organisations operate within a formal governance environment where incident reporting, investigation, corrective action, and occupational safety obligations are clearly emphasised (Abu Dhabi Department of Municipalities and Transport, 2024; Abu Dhabi Public Health Center, 2024; Department of Energy, 2025; Ministry of Human Resources and Emiratisation, 2023). However, the findings suggest that regulatory compliance alone is not sufficient to guarantee efficient investigations. Organisations may have investigation policies and reporting systems in place, but these systems will be less effective if employees do not trust

them or perceive them as fair and useful. Therefore, improving investigation efficiency requires both procedural compliance and positive employee perception.

The findings also contribute to theory by extending the understanding of investigation efficiency as a socio-technical outcome. Previous literature has examined incident learning, safety climate, employee voice, organisational justice, security management, and integrated safety-security systems. This study brings these areas together by showing that Employee Perception is a key mechanism through which Safety Management Practices and Security Management Practices influence Investigation Efficiency. This supports the view that organisational systems produce stronger outcomes when they are supported by employee trust, fairness, voice, and engagement. It also reinforces the importance of integrated safety and security governance in high-risk sectors (Marquez Tejon et al., 2023; Ylönen & Björkman, 2023; Zhang et al., 2024).

Practically, the findings suggest that UAE energy-sector organisations should strengthen both the technical and human dimensions of investigation systems. Safety and security practices should be clearly communicated, consistently implemented, and visibly supported by management. Investigation processes should be designed to promote fairness, confidentiality, transparency, and learning rather than blame. Employees should be encouraged to report concerns, participate in investigations, and provide feedback without fear of punishment. Organisations should also integrate safety and security investigation processes where appropriate, especially when incidents involve overlapping operational, physical, cyber, or human factors.

Overall, the findings confirm that Employee Perception plays a central mediating role in the relationship between Safety and Security Management Practices and Investigation Efficiency. Strong safety and security systems improve investigation efficiency most effectively when they create positive employee perceptions of trust, fairness, protection, and organisational support. In the UAE energy sector, where regulatory expectations are high and operational risks are significant, this finding is especially important. It shows that efficient investigations require more than formal compliance; they require employees who believe in the integrity, fairness, and usefulness of the investigation process.

6. Conclusion

This study examined Employee Perception as a Mediator Between Safety and Security Management Practices and Investigation Efficiency in the United Arab Emirates Energy Sector. The main purpose was to determine whether organisational safety and security management practices improve investigation efficiency through formal systems, and whether this relationship is strengthened through employee perception.

The findings provide strong empirical support for the proposed conceptual framework. The measurement model confirmed that all constructs, namely Safety Management Practices, Security Management Practices, Employee Perception, and Investigation Efficiency, were measured reliably and validly. The Cronbach's Alpha, Composite Reliability, and Average Variance Extracted values all exceeded the recommended thresholds, confirming internal

consistency and convergent validity. The discriminant validity results were also acceptable, although the close relationship between safety and security management practices reflects the integrated nature of risk management in high-risk energy-sector environments.

The structural model results further demonstrated that the framework has strong explanatory and predictive power. Safety Management Practices and Security Management Practices jointly explained a substantial proportion of the variance in Employee Perception. In turn, Employee Perception explained a substantial proportion of the variance in Investigation Efficiency. The positive predictive relevance values also confirmed that the model is meaningful for understanding investigation performance in the UAE energy-sector context.

The direct path results showed that both Security Management Practices and Safety Management Practices have significant positive effects on Employee Perception. However, Safety Management Practices had a stronger effect, suggesting that employees may respond more strongly to visible safety-related policies, procedures, training, reporting mechanisms, and management commitment. At the same time, the significant effect of Security Management Practices confirms that security systems, organisational preparedness, and protective structures also shape employee perceptions.

The most important finding of the study is the strong effect of Employee Perception on Investigation Efficiency. This confirms that efficient investigations depend not only on formal procedures, reporting systems, or regulatory requirements, but also on whether employees perceive the process as fair, safe, trustworthy, and meaningful. When employees hold positive perceptions of safety and security practices, they are more likely to cooperate, provide accurate information, participate in investigations, and support corrective actions.

The mediation results confirmed that Employee Perception significantly mediates the relationship between both forms of management practices and Investigation Efficiency. This means that safety and security management practices improve investigation efficiency not simply because they exist as formal systems, but because they shape employees' perceptions and behaviours. In other words, the effectiveness of safety and security systems depends on how employees interpret and experience them. If employees perceive these systems as supportive, transparent, fair, and protective, investigation processes are more likely to become timely, accurate, cooperative, and learning-oriented.

In the UAE energy sector, this conclusion is especially important because organisations operate under strong occupational safety, health, security, and incident-reporting expectations. However, the findings of this study suggest that compliance alone is not sufficient. Organisations must also ensure that employees trust the investigation process and perceive safety and security practices as credible and fair. Without positive employee perception, formal compliance may not translate into efficient investigation outcomes or meaningful organisational learning.

Overall, the study concludes that **Employee Perception is a central mechanism linking Safety Management Practices and Security Management Practices to Investigation Efficiency**. The findings contribute to the study area by integrating safety management,

security management, employee perception, and investigation efficiency into one empirically tested framework. Practically, the study highlights the need for UAE energy-sector organisations to strengthen not only their technical and procedural systems, but also the employee experience of those systems.

Improving investigation efficiency therefore requires a combined focus on regulatory compliance, integrated safety and security governance, fair investigation practices, transparent communication, employee trust, and learning-oriented investigation processes. The study provides evidence that investigation efficiency in the UAE energy sector is best achieved when safety and security systems are not only implemented, but also positively perceived by employees. When employees trust the systems around them, they are more likely to engage with investigations honestly and constructively, enabling organisations to identify causes, implement effective corrective actions, prevent recurrence, and strengthen long-term organisational resilience.

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