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Research Title

**The Role of Leadership and Organizational Culture in
Enhancing Safety and Performance in Power and
Desalination plants in Saudi Arabia**

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Abstract

This study examines the role of leadership and organizational culture in enhancing safety and performance within power and desalination plants in Saudi Arabia. These facilities operate in high-risk environments where the interaction between human behavior and technical systems plays a critical role in achieving reliability and efficiency. The research aims to explore how leadership behaviors and organizational culture collectively influence employee attitudes, safety compliance, and operational outcomes. A quantitative approach was adopted, using a structured questionnaire distributed among employees of the Saudi Water Authority (SWA), Marafiq, the Saudi Electricity Company (SEC), and NOMAC in the Western Region. A total of 278 valid responses were analyzed using the Statistical Package for the Social Sciences (SPSS), version 28, through descriptive statistics, reliability tests, correlation, ANOVA, and multiple regression analyses. The findings revealed that transformational leadership and a strong, safety-oriented organizational culture significantly improve safety compliance and operational performance. Results also indicated differences in perceptions across departments and experience levels, where managers and senior staff exhibited more positive views compared to less experienced employees. The study contributes to the theoretical understanding of leadership and culture interaction in industrial contexts and provides practical recommendations for leaders and policymakers to strengthen workplace culture, improve safety practices, and enhance performance. These outcomes align with the objectives of Saudi Vision 2030 in promoting operational excellence and sustainable industrial development.

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Chapter One – Introduction

Introduction:

In industrial environments like power generation and water desalination plants, maintaining safety and achieving strong operational performance are daily challenges. These plants operate under high-risk conditions and depend not only on technical systems but also on the way of people work together. From my experience as an operations engineer, I have realized that even highly advanced facilities could face safety issues or inefficiencies when leadership is weak or the workplace culture does not promote effective communication and safety mindset.

Over the past few years, the demand for electricity and fresh water has increased rapidly especially in countries like Saudi Arabia where natural resources are limited and the population is growing quickly. This has placed extra pressure on utility plants to perform reliably while maintaining high safety standards. Under these conditions, even small human mistakes or technical errors can lead to serious issues such as worker injuries, system shutdowns or environmental harm.

Leadership and organizational culture are not merely soft aspects of management. They are central to how people behave, how rules are followed, and how teams respond under pressure. A leader's attitude toward safety or performance is often mirrored by their team. Likewise, culture affects whether employees speak up about risks, follow procedures, or take shortcuts. Guldenmund (2000) pointed out that what people believe and value at work strongly shapes how safety rules are applied in practice.

It is also important to recognize that leadership and culture influence each other. Leaders shape the culture, but they are also affected by it. If a plant has a culture that ignores safety in favor of productivity, even well-intentioned leaders might struggle to change things. On the other hand, if leadership consistently supports transparency and accountability, that mindset can spread throughout the organization (Schein, 2010).

This research is especially timely given Saudi Arabia's Vision 2030, which emphasizes sustainability, industrial modernization, and operational excellence. Enhancing leadership practices and organizational culture in critical sectors like energy and water can directly support these national goals.

Research Problem and Questions:

Research Problem (declarative):

There is still a clear gap in understanding how leadership practices and organizational culture affect safety compliance and operational performance in power and desalination plants especially within Saudi Arabia's industrial sector. Based on the researcher's direct experience in this field, most facilities may be well-equipped with advanced systems and procedures but actual performance often depends on human factors. When issues arise, they are rarely caused by technical failures only but they often stem from poor communication, inconsistent leadership, or a workplace culture that fails to prioritize safety (Reason, 1997).

In Saudi Arabia, power and desalination plants are essential to national infrastructure, making reliability and risk control especially important. While the country continues advancing its Vision 2030 goals with major investments in technology and infrastructure, less attention has been given to the human side of operations. Key areas such as leadership and organizational culture have not always received the same level of focus. These plants depend on diverse, cross-functional teams, and their ability to operate safely and efficiently often depends on how leaders set expectations and how cultural values shape daily behavior.

The Saudi workplace environment presents unique cultural dynamics that influence leadership effectiveness and organizational communication. Characteristics such as high-power distance, hierarchical decision-making, indirect communication styles, and reluctance to challenge authority can restrict open dialogue, reduce feedback flow, and discourage employees from reporting safety risks or questioning unsafe practices. In such environments, leadership behavior becomes especially critical for building trust, transparency, and safety accountability.

My motivation for this research comes from working directly in this kind of environment. I have seen how varying leadership styles and cultural expectations can impact team behavior, communication, and safety outcomes. These observations revealed the need to study this relationship more deeply within the Saudi Arabian context.

This challenge is not unique to Saudi Arabia. Across the Gulf region, many industrial operations share similar cultural and managerial dynamics, such as hierarchical decision-making, indirect communication, and resistance to challenging authority. These factors influence how safety compliance is understood, reported, and addressed. Although these

dynamics are common across the region, there is still limited research on how leadership and organizational culture jointly shape outcomes in high-risk industries.

Globally, the role of leadership and culture in shaping safety performance is well established (Zohar, 2010; Clarke, 2013). However, most research comes from Western contexts and may not fully reflect the cultural realities or workforce dynamics of the Middle East. Applying global models without local adaptation can result in strategies that do not align with employee expectations or operational norms.

These gaps highlight the need for localized research into how leadership and culture interact in Saudi Arabia's power and desalination sector. Better understanding this relationship could inform the design of more effective leadership models, cultural strategies, and operational practices. This is the central issue this study seeks to address.

Main Research Question:

To what extent do leadership practices and organizational culture contribute to enhancing safety and performance in power and desalination plants in Saudi Arabia?

This central question explores how leadership behavior and organizational culture together affect key outcomes such as safety compliance and operational performance. In complex and high-risk environments like Saudi Arabia's power and desalination plants, understanding this relationship can help shape more effective management approaches, practical safety frameworks, and policy decisions that align with the specific cultural and operational realities of local organizations.

Sub-questions:

- 1. What leadership styles are most commonly to practiced in power and desalination plants?**

This question seeks to identify which leadership styles such as transformational, transactional, or servant leadership are most frequently observed in the sector. Understanding these patterns provides a foundation for analyzing how different leadership approaches influence employee behavior, communication, and safety performance in high-risk operational environments.

2. How does leadership influence safety compliance and employee accountability?

Leadership plays a key role in shaping how employees understand risk, follow safety procedures, and take responsibility for their actions. This question explores how specific leadership behaviors including communication, role modeling, and consistent enforcement of standards contribute to building a culture of safety and accountability. This is especially relevant in Saudi Arabia's power and desalination facilities, where even minor errors can have serious operational and safety consequences.

3. What are the most common cultural characteristics in Saudi Arabia's power and desalination plants?

Organizational culture includes the shared values, norms, and informal practices that guide workplace behavior. This question aims to identify the prevailing cultural features in Saudi power and desalination facilities such as hierarchical decision-making, indirect communication, and multicultural team dynamics and evaluate whether these characteristics support or hinder safety and performance goals.

4. How does organizational culture affect teamwork, motivation, and risk behavior?

Organizational culture influences how employees communicate, collaborate, and respond to operational challenges. This question examines whether a strong, safety-oriented culture leads to improved teamwork, higher motivation, and safer decision-making. It also explores how cultural values, such as respect for authority and group harmony, shape how employees perceive and manage risk.

5. What is the combined impact of leadership and organizational culture on overall plant performance?

While leadership and culture can independently influence performance, this question focuses on their interaction. It considers whether alignment between leadership behaviors and cultural values produces superior outcomes, or whether mismatches between the two may weaken operational effectiveness.

6. Are there specific leadership and cultural practices associated with high safety records and strong operational performance?

This question seeks to identify best practices and patterns from facilities that demonstrate exceptional safety and performance results. The goal is to generate practical insights and benchmarks that plant managers, engineers, supervisors, and technicians can apply to enhance operational outcomes and sustain high safety standards across the sector.

Field of the Study:

This research focuses on power and desalination plants located in the western region of Saudi Arabia, specifically targeting the Saudi Water Authority (SWA) facilities in Yanbu and Shoaiba, Marafiq Company in Yanbu, and the Saudi Electricity Company (SEC) and NOMAC independent water and power plants in Rabigh.

These sites were selected for three key reasons:

1. **Strategic importance** - they are among the Kingdom's largest and most critical energy and water producers, forming a major part of the western regional utility network.
2. **Operational diversity** - they include both government-operated and private/independent power and water production plants, offering varied leadership structures and cultural environments.
3. **Accessibility and relevance** - the researcher's professional background in the sector facilitates practical access and contextual understanding, allowing for realistic insights into leadership and cultural dynamics affecting safety and performance.

The Importance of The Research:

This study is especially relevant to Saudi Arabia's Vision 2030. As the nation continues its efforts to modernize and enhance both operational performance and workplace safety, critical sectors such as energy and water are under increasing pressure to operate more efficiently and with reduced risk. Power and desalination plants, which form a core part of the country's infrastructure, cannot rely on technology alone. Leadership practices and organizational culture play a significant role in improving safety, maintaining employee motivation, and sustaining high levels of performance. Based on the researcher's direct experience in this field, the study takes a practical look at how leadership expectations, communication styles, and workplace norms affect daily operations.

The research is particularly significant for the western region of Saudi Arabia, where major facilities such as the Saudi Water Authority (SWA) in Yanbu and Shoaiba, Marafiq Company in Yanbu, and Saudi Electricity Company (SEC) and NOMAC in Rabigh represent some of the Kingdom's most critical industrial assets. The findings from these sites can provide practical insights that support operational excellence, enhance workforce safety, and promote leadership and cultural development across the national energy and water sectors.

Beyond Saudi Arabia, industrial sectors across the Gulf and wider Arab region face similar challenges. These include rising demand, centralized decision-making, and strict safety regulations. However, there is still limited research that looks at leadership and organizational culture as connected factors shaping how these workplaces perform. Many studies examine either leadership or employee satisfaction separately without fully exploring how the two work together. This research addresses that gap with a regional analysis of high-risk workplaces, where authority and group dynamics shape employee behavior.

From a global academic perspective, this study contributes to ongoing discussions in the fields of leadership and organizational behavior. While theories such as transformational leadership (Bass, 1985) and organizational culture (Schein, 2010) are widely recognized, they are often applied without fully considering the unique characteristics of industrial environments in the Middle East. Moreover, research on industrial safety has typically focused on sectors such as oil and gas or manufacturing. However, the power and desalination sector, though highly complex and safety-critical has received comparatively little academic attention. This study helps bridge that gap by connecting global theory with local operational realities.

Knowledge gained through this research may benefit plant managers, engineers and human resource professionals. The findings can help shape leadership training, employee engagement strategies, and culture-focused initiatives that reflect the operational realities of Saudi Arabia's utility sector. In addition, the study may assist policymakers and organizational leaders in closing the gap between technical advancements and the development of human systems. This support aligns with broader national goals focused on long-term growth and human-centered development.

Over time, this research may serve as a valuable reference for professionals seeking to modernize leadership approaches and safety systems in complex operational environments. It may also inspire future studies that examine how leadership and organizational culture work together to affect outcomes in settings where both operational accuracy and human decision-making are critical.

By linking management theory (Bass, 1985; Burns, 1978) and organizational culture (Schein, 2010) with real-world issues such as safety and performance (Clarke, 2013; Zohar, 2010), this study aims to offer practical insights for both academics and industry professionals. The findings may help guide managers, leadership developers, and policymakers toward strategies that boost performance while also creating safer work environments.

The Objectives of The Research:

Main Objective:

The main objective of this study is to explore how leadership practices and organizational culture influence safety and performance in power and desalination plants. It focuses on understanding how these two key management elements work together to shape employee behavior, operational discipline, and overall effectiveness in high-risk industrial environments.

By concentrating on the specific context of Saudi Arabia's power and desalination sector, the research aims to generate findings that are both theoretically significant and practically applicable. The results are intended to support policymakers, plant managers, and organizational leaders in strengthening leadership practices and fostering positive workplace cultures that enhance safety and operational outcomes.

Specific Objectives:

- 1. To identify the most suitable leadership styles in power and desalination plants in Saudi Arabia.**

This objective involves examining and categorizing leadership styles such as transformational, transactional, and servant leadership that best suit the operational demands of utility facilities. Drawing on established leadership theory (Bass, 1985), the aim is to build a foundational understanding for assessing leadership effectiveness in these environments.

- 2. To explore the relationship between leadership practices and safety compliance.**

This objective focuses on understanding how leadership behaviors influence safety outcomes, including adherence to procedures, accountability, and the reporting of risks. It specifically considers how leaders set expectations, make decisions, and support safety-related initiatives within the organization.

- 3. To analyze the characteristics of organizational culture within these sectors.**

This objective aims to identify the key cultural characteristics that shape daily operations in power and desalination plants. These may include leadership hierarchy, communication openness, teamwork dynamics, and the extent to which a safety-oriented mindset is embedded within the organizational culture.

- 4. To assess how organizational culture affects operational performance and employee behavior.**

This objective examines how shared values, workplace norms, and informal routines influence key outcomes such as productivity, morale, teamwork, and system reliability. It also considers whether the existing culture supports or undermines the organization's broader goals.

- 5. To investigate how leadership and organizational culture interact and whether their alignment or misalignment enhances or weakens safety and operational outcomes.**

This objective seeks to determine how leadership behavior and cultural norms either align to promote high performance or conflict in ways that create operational challenges.

6. To provide practical recommendations for enhancing leadership effectiveness and strengthening organizational culture in the power and desalination sector.

Based on the research findings, this objective aims to offer actionable strategies to improve safety and operational performance. These may include leadership development programs, cultural alignment initiatives, and employee engagement strategies designed to promote continuous improvement and sustainability across the sector.

Research Hypotheses:

To explore the influence of leadership and organizational culture on safety compliance and operational performance in Saudi Arabia's power and desalination plants, the following research hypotheses have been developed. These hypotheses examine both the independent and combined effects of leadership behavior and cultural dynamics on key workplace outcomes. They reflect the study's focus on applying established theoretical frameworks to a localized, high-risk industrial environment.

Main Hypotheses (H_1):

There is a significant relationship between leadership practices and organizational culture, and the improvement of safety and operational performance in power and desalination plants in Saudi Arabia.

Sub-Hypotheses:

Causal Hypotheses:

1. **H_{1-1} :** Effective leadership practices positively influence safety compliance among employees in power and desalination plants.

This hypothesis suggests that when leaders clearly set expectations and promote accountability, employees are more likely to follow safety rules and report risks.

2. **H_1-2 :** A strong organizational culture contributes to better operational performance in power and desalination plant.

This hypothesis is based on the idea that shared values, team alignment, and a clear sense of purpose help improve coordination, support better decisions and increase overall efficiency.

Correlational Hypotheses:

3. **H_1-3 :** There is a significant relationship between leadership style and the overall safety performance of power and desalination operations.

This hypothesis does not assume a direct cause-and-effect relationship. Instead, it explores whether leadership styles such as transformational or transactional are linked to different levels of safety performance.

4. **H_1-4 :** There is a positive association between organizational cultural attributes and employee engagement levels in high-risk operational environments.

This hypothesis assumes that certain cultural attributes such as trust, effective communication, and continuous learning positively influence employee engagement. In high-risk environments, these cultural qualities are more likely to promote motivation, responsibility, and active participation.

Null Hypotheses (H_0):

Null Hypotheses for Safety:

H_0-1 : There is no significant relationship between leadership practices and safety compliance in power and desalination plants.

Null Hypotheses for Performance:

H_0-2 : Organizational culture does not significantly influence operational performance in power and desalination plants.

These null hypotheses provide a baseline for statistical analysis and help ensure that all findings are evaluated with objectivity and scientific accuracy.

Theoretical Model:

This study is guided by Transformational Leadership Theory (Burns, 1978; Bass, 1985) and Organizational Culture Theory (Schein, 2010). Together, these theories explain how leadership behavior and cultural values influence safety and operational performance in high-risk environments such as power and desalination plants.

The proposed model suggests that leadership practices and organizational culture are the primary factors affecting safety compliance and operational performance. Leadership shapes employee motivation, communication, and adherence to safety standards, while organizational culture establishes the shared norms and values that guide workplace behavior. The alignment between leadership behaviors and cultural values is expected to enhance both safety and performance outcomes, whereas misalignment may create communication gaps or operational inefficiencies.

The model integrates these relationships within the context of Saudi Arabia's power and desalination sector. In this environment, hierarchical organizational structures, high power distance, and multicultural workforces influence both leadership effectiveness and cultural dynamics. It forms the foundation for the study's hypotheses and serves as the conceptual basis for the empirical analysis presented in subsequent chapters.

Figure 1 below illustrates the proposed theoretical model, showing the relationships between leadership practices, organizational culture, safety compliance, and operational performance.

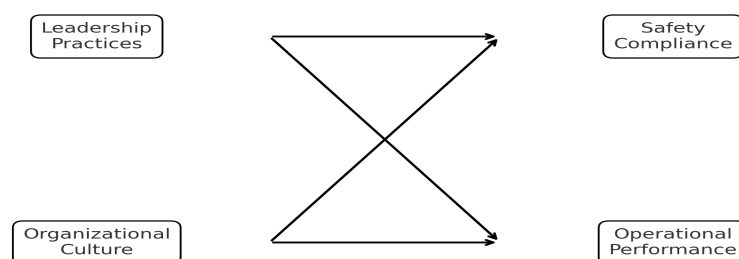


Figure 1: *Theoretical Model - Relationship Between Leadership, Organizational Culture, Safety Compliance and Operational Performance*

Chapter Two – Literature Review

Introduction:

This chapter reviews the literature on leadership, organizational culture, safety, and operational performance in industrial environments. Its primary aim is to establish a clear theoretical foundation for the study and identify the gaps that justify conducting research in this field. The chapter highlights how leadership practices and organizational culture shape employees' safety behaviors and influence the overall performance of industrial operations, with particular attention on the environment of Saudi Arabia's power generation and desalination plants.

Power generation and desalination plants operate in complex, high-risk environments where human performance, communication, and decision-making are as vital as technical systems. Research across various industries has consistently shown that leadership style and organizational culture are critical factors shaping workplace behavior, employee motivation, and safety outcomes. However, most of this evidence originates from Western contexts, where organizational structures and cultural norms differ significantly from those found in the Middle East.

In Saudi Arabia, Vision 2030 emphasizes operational excellence, sustainability, and human capital development in strategic sectors such as energy and water. This national vision has increased attention on how effective leadership and strong organizational cultures can enhance both safety and efficiency. Despite this growing interest, relatively few studies have directly examined these relationships within the specific context of Saudi Arabia's power and desalination plants.

Accordingly, this chapter reviews the main theoretical and empirical contributions related to leadership, culture, safety, and operational performance. It begins with an examination of safety and operational performance as key organizational outcomes. It then discusses leadership and organizational culture as influential predictors of these outcomes. The chapter also explores research on safety climate and communication as potential mediating factors, followed by a synthesis of previous studies. The final section presents the theoretical framework and conceptual model that guide the empirical analysis in subsequent chapters.

Dependent Variables: Safety and Operational Performance:

In industrial environments such as power generation and desalination plants, safety and operational performance are two essential indicators of organizational effectiveness. These facilities operate through highly integrated technical systems, where even minor failures can lead to large-scale risks. For this reason, safety and performance are not viewed solely as technical measures but as outcomes shaped by leadership behavior, employee attitudes, and the underlying organizational culture.

Safety Performance:

Safety performance reflects the organization's ability to prevent accidents, control hazards, and promote behaviors that reduce risk. It involves compliance with safety procedures, consistent reporting of unsafe conditions, and the adoption of proactive safety practices. According to Reason (1997), failures in safety rarely result from a single error but from a combination of latent conditions such as poor communication, weak leadership, and ineffective safety culture elements illustrated in his "Swiss Cheese Model" of accident causation.

Safety research also highlights the importance of employees' shared perceptions regarding how seriously safety is valued within the organization. This concept referred to as safety climate was introduced by Zohar (2010) and is widely used to evaluate how leadership and organizational priorities shape attitudes toward safety. Studies repeatedly show that when managers demonstrate visible commitment to safety, employees are more likely to adopt safe behaviors and actively report risks (Clarke, 2013; Alzahrani & Eltayeb, 2021).

Evidence from Saudi Arabia reinforces this view. Almutairi et al. (2020) found that participatory leadership and open communication contributed to reductions in safety incidents in industrial sites. Similarly, Almalki et al. (2019) reported that a strong safety culture enhanced compliance in water and power projects. These findings suggest that technical controls alone are insufficient achieving safety excellence requires consistent leadership commitment and a culture that fosters accountability, learning, and open reporting.

In this study, safety performance is considered a reflection of collective beliefs, leadership influence, and organizational values. It is not limited to following procedures but includes employees' willingness to act safely, report hazards, and engage with safety initiatives.

Operational Performance:

Operational performance refers to an organization's ability to achieve its production objectives efficiently and reliably while maintaining quality and minimizing downtime, costs, and risk. It reflects how effectively human, technical, and procedural components interact to achieve sustained operational excellence. In the energy and water sector, operational performance includes indicators such as production efficiency, system reliability, process optimization, and responsiveness to emergencies or equipment failures.

Neely et al. (2005) and Richard et al. (2009) emphasized that operational performance should be assessed not only through output but also through innovation, employee productivity, and resource utilization. In safety-critical industries, leadership and organizational culture influence these dimensions by shaping communication, motivation, and teamwork. Bass and Riggio (2006) argue that transformational leaders enhance operational performance by aligning individual and organizational goals and fostering employee commitment.

Empirical evidence supports this relationship. Alqaralleh and Al-Tarawneh (2020) found that safety-oriented leadership in manufacturing improved operational efficiency and reduced downtime. Alotaibi and Campbell (2022) also found that cultural dimensions such as power distance and collectivism influenced decision-making patterns and coordination within Saudi water facilities. These findings underscore that operational performance depends as much on human and cultural alignment as on technical capacity.

Within Saudi Arabia's power and desalination sector, operational performance is vital to meeting national demand for electricity and water while supporting the goals of Vision 2030. Continuous operation, minimal interruptions, and high reliability are essential, as any failure can disrupt service delivery and infrastructure stability. Therefore, this research conceptualizes operational performance as an integrated outcome of leadership, organizational culture, and safety practices reflecting how effectively the organization balances productivity with risk management.

Interdependence Between Safety and Operational Performance:

Although safety and operational performance are distinct outcomes, they are closely interconnected. Safe operations minimize disruptions, equipment failures, and human errors,

thereby enhancing stability and productivity. likewise, strong operational performance relies on disciplined safety practices and effective risk management systems.

Studies in industrial safety management indicate that high-performing organizations typically maintain a mature safety culture, where safety and performance are seen as complementary rather than competing priorities (Clarke, 2013; Hale et al., 2010). This interdependence is especially relevant in Saudi Arabia's power and desalination plants, where reliability and risk control are national imperatives. Integrating safety into operational strategies not only protects workers but also ensures sustainable performance and system resilience.

Accordingly, this study considers safety and operational performance as complementary dependent variables, both influenced by leadership behavior and organizational culture. When leadership practices and cultural values support learning, communication, and accountability, both safety and performance outcomes tend to improve.

Independent Variables: Leadership and Organizational Culture:

Leadership and organizational culture are among the most influential factors shaping safety and operational performance in industrial organizations. In high-risk settings such as power generation and water desalination plants, leadership determines how safety policies are communicated and enforced, while culture defines how employees interpret and act upon those policies. The interaction between leadership and culture forms the foundation of workplace behavior, motivation, and performance outcomes. This section discusses the theoretical and empirical literature on leadership and organizational culture, with emphasis on their relevance to Saudi Arabia's industrial environment.

Leadership:

Leadership refers to the processes through which individuals guide, motivate, and influence others toward achieving shared organizational goals. In safety-critical settings, leadership is not limited to oversight; it involves building trust, encouraging open communication, and ensuring that employees understand the importance of safe and reliable operations (Northouse, 2019).

Transformational Leadership

Among modern leadership theories, transformational leadership has received considerable attention due to its strong association with safety and performance outcomes. Originating from Burns (1978) and expanded by Bass (1985), transformational leadership emphasizes inspiring others, fostering innovation, and supporting individual development. It incorporates four interconnected components:

1. **Idealized Influence** – Leaders act as role models and earn employees' respect and trust.
2. **Inspirational Motivation** – Leaders promote a compelling vision that guides employees toward common goals.
3. **Intellectual Stimulation** – Leaders encourage creativity, questioning of assumptions, and solving operational problems in new ways.
4. **Individualized Consideration** – Leaders show genuine concern for employees' needs and development (Bass & Riggio, 2006).

In industrial organizations, this leadership style has been linked to stronger safety participation, greater teamwork, and more consistent compliance with procedures. Clarke (2013) showed that transformational leadership strengthens employees' perceptions of safety climate, while Kapp (2012) reported that leaders who involve employees in decision-making contribute to better safety outcomes.

Evidence from Saudi Arabia supports these findings. For example, Alzahrani and Eltayeb (2021) observed that transformational leadership positively influenced safety behaviors in construction projects. Similarly, Almutairi et al. (2020) found that leaders who actively engage with workers and demonstrate visible commitment to safety contribute to lower accident rates in industrial plants. These studies highlight the value of leadership that emphasizes communication, trust, and empowerment in high-risk environments.

Transactional and Other Leadership Styles

Transactional leadership, which focuses on structured supervision, rewards, and corrective actions, also influences safety and performance. Bass (1990) noted that transactional leadership helps maintain discipline and ensures that employees adhere to established procedures. While not as motivational as transformational leadership, it complements it by reinforcing expectations and providing clarity. Research suggests that

combining both styles can improve safety compliance and operational reliability (Mullen et al., 2017).

Other leadership approaches such as servant leadership and ethical leadership also contribute to shaping safe and productive workplaces. Servant leadership, introduced by Greenleaf (1977), prioritizes employee well-being and development, while ethical leadership emphasizes fairness, responsibility, and transparency (Brown & Treviño, 2006). Studies indicate that these styles enhance trust and open communication, which are essential for effective safety management (Clarke, 2012; Wu et al., 2018).

Leadership in the Saudi Industrial Context

In Saudi Arabia's power and desalination plants, leadership plays an especially important role due to the multicultural workforce and generally hierarchical organizational structures. Leaders who adopt participatory behaviors and communicate clearly can help bridge cultural differences and encourage consistent adherence to safety expectations. Transformational leadership is particularly valuable in such settings, as it promotes employee involvement, shared responsibility and qualities essential for maintaining safety and operational excellence.

Organizational Culture:

Organizational culture encompasses the shared beliefs, values, and assumptions that guide behavior within a workplace. Schein (2010) conceptualized organizational culture as consisting of three levels:

1. **Artifacts** – visible elements such as procedures, office layout, safety signs, and communication patterns.
2. **Espoused Values** – declared principles and strategies that organizations claim to follow.
3. **Basic Assumptions** – deeply ingrained beliefs and norms that influence how employees think, behave, and respond to challenges.

In high-risk industries, culture plays a decisive role in shaping employees' attitudes toward safety and performance. A strong safety culture where safety is treated as a fundamental organizational value is associated with fewer accidents, improved communication, and greater operational stability (Zohar, 2010; Guldenmund, 2000).

Cultural Dynamics in Saudi Organizations

Saudi Arabia's national cultural characteristics, such as relatively high-power distance, strong group orientation, and respect for authority, influence workplace interactions. Using Hofstede's (2001) cultural dimensions, researchers have shown that these traits can discourage employees from reporting hazards or challenging unsafe practices unless leaders actively encourage openness (Alotaibi & Campbell, 2022). At the same time, collectivist values can strengthen teamwork and shared responsibility when supported by effective leadership.

Empirical studies from Saudi industrial settings demonstrate the importance of organizational culture for safety and performance. Almalki et al. (2019) found that cultural values emphasizing communication and leadership commitment significantly improved performance in water and power projects. Alqaralleh and Al-Tarawneh (2020) similarly reported that positive cultural norms such as learning orientation and openness enhanced safety compliance in manufacturing environments.

Interaction Between Leadership and Culture

Leadership and culture are mutually reinforcing. Leaders shape culture through their actions, decisions, and communication, while existing cultural norms influence how leadership behaviors are interpreted and enacted. Schein (2010) argues that leaders play the primary role in creating, embedding, and sustaining culture. In safety-critical industries, this means that leadership must consistently promote values such as accountability, transparency, and learning.

In Saudi power and desalination plants, the interaction between leadership and culture has profound implications. Effective leaders not only enforce rules but also cultivate cultural norms that encourage safe behavior, cross-departmental coordination, and proactive problem-solving. When leadership behavior aligns with cultural expectations while also promoting continuous improvement, organizations are better able to maintain safe and high-performing operations.

The Mediating Role of Safety Climate and Communication:

A considerable body of research suggests that the influence of leadership and organizational culture on safety and operational performance is not purely direct. Instead, these relationships often operate through important intermediate mechanisms most notably safety climate and organizational communication. These mediators shape how employees interpret leadership behaviors and cultural expectations, and how these interpretations translate into practical actions on the shop floor.

Safety Climate as a Mediating Mechanism:

Safety climate refers to employees' shared perceptions of how seriously the organization prioritizes safety and how consistently leaders reinforce safety-related behaviors (Zohar, 2010). It reflects day-to-day cues such as leaders' visibility in safety matters, the availability of reporting channels, and how supervisors respond to incidents or suggestions.

When employees believe that their leaders genuinely prioritize safety, they are more likely to comply with procedures, report hazards, and intervene when unsafe conditions occur. Safety climate therefore acts as a psychological lens connecting leadership behavior and organizational culture to actual safety performance.

Research widely supports this mediating relationship:

- Clarke (2013) demonstrated that transformational leadership strengthens safety climate, which then promotes safer employee behaviors.
- Wu, Chen, and Li (2018) found that safety-specific transformational leadership enhances performance primarily by improving safety climate perceptions.
- Kapp (2012) showed that supervisors' leadership practices influence safety performance indirectly through group safety climate.

These findings indicate that leadership or cultural improvements can only translate into real behavioral change when employees perceive safety as a shared, collective priority.

In Saudi Arabia's industrial context where diverse nationalities and hierarchical structures may create communication barriers, a strong safety climate becomes even more critical. It serves as an equalizer, ensuring that expectations are uniformly understood and that frontline employees feel supported in raising safety concerns.

Communication as a Linking Mechanism:

Communication plays a parallel and complementary mediating role. Effective communication ensures that safety values, performance expectations, and operational procedures are transmitted clearly across all levels of the organization. In environments where misunderstanding or delayed information can lead to significant risk, communication quality directly affects both safety and efficiency.

Transformational leaders typically enhance communication through:

- expressing a clear and compelling safety vision,
- encouraging open dialogue and feedback,
- reinforcing messages through consistent actions, and
- ensuring that information flows upward as well as downward (Bass & Riggio, 2006).

A supportive culture strengthens this process. When cultural norms encourage transparency and learning, employees feel more comfortable reporting hazards, discussing near-misses, and raising operational issues without fear of blame.

Empirical evidence highlights this mediating role:

- Hale, Borys, and Adams (2010) noted that transparent, two-way communication strengthens the link between organizational practices and safety outcomes.
- Mullen, Kelloway, and Teed (2017) found that transformational leadership improves safety performance most strongly when communication systems support trust and collaboration.
- Studies in Gulf-region industries emphasize that communication mitigates cultural barriers related to hierarchy and power distance, allowing employees to participate more actively in safety practices.

Relevance to Saudi Arabia's Power and Desalination Sector:

In Saudi power and desalination plants, operations depend on multidisciplinary teams, strict regulatory requirements, and continuous coordination. Within this environment, communication and safety climate play essential roles in ensuring safe and uninterrupted production. Given the hierarchical nature of many organizations in the region, frontline employees may hesitate to voice concerns unless leadership explicitly encourages transparency and engages directly with workers.

Strengthening safety climate and communication therefore acts as a bridge between leadership intentions, cultural expectations, and actual behavior on the ground. These mediators help ensure that safety is not just a formal policy but a lived and shared value across the organization.

Together, safety climate and communication form the pathways through which leadership and culture exert their greatest influence. They translate high-level intentions into observable practices, support employee engagement, and ensure consistent adherence to safety and performance standards. For this reason, these mediating variables are essential components of the conceptual framework used in this study.

Summary of Previous Studies:

A substantial body of research has examined how leadership and organizational culture influence safety and performance across various industrial sectors. While much of this evidence comes from Western or global contexts, several key studies have also been conducted in Saudi Arabia and the wider Gulf region. These regional contributions provide valuable insights and a foundation for the present study, while also revealing a clear gap in research focused specifically on the power and desalination sector.

In the Saudi context, Alzahrani and Eltayeb (2021) investigated the impact of transformational leadership on safety performance in the construction sector. Their results showed that transformational leadership positively affected safety outcomes. Although focused on a different industry, their findings remain relevant to high-risk environments such as power and desalination plants, where leadership plays a crucial role in promoting safe work practices. Similarly, Almutairi et al. (2020) examined leadership behaviors in Saudi industrial facilities and found that visible, participatory leadership correlated with lower incident rates and greater employee engagement with safety. Their research highlights how leadership visibility and worker involvement foster safer organizational behavior.

The role of organizational culture has also received considerable attention. Almalki et al. (2019) found that both safety climate and deeper cultural values directly influenced performance in Saudi water and power projects. Their findings suggest that leadership behavior and cultural alignment jointly determine how employees perceive and manage risk. Alotaibi and Campbell (2022), applying Hofstede's (2001) cultural dimensions, examined the Saudi National Water Company and concluded that high power distance and uncertainty

avoidance shaped how employees responded to leadership and communication. This emphasizes the importance of adapting leadership approaches to the local cultural context.

In the broader regional setting, Alqaralleh and Al-Tarawneh (2020) studied safety leadership in Jordanian manufacturing plants. They found that active leadership engagement led to safer employee behaviors and higher compliance with safety standards. However, their study paid limited attention to the cultural factors that might influence or moderate these relationships a gap that the present study seeks to address.

Globally, several foundational works have established the theoretical link between leadership, culture, and safety. Clarke (2013) conducted a meta-analysis showing that both transformational and transactional leadership styles significantly affect safety behavior, with transformational leadership producing stronger proactive engagement. Zohar (2010) introduced the concept of safety climate, referring to employees' shared perceptions of how seriously safety is prioritized in their organization. His findings demonstrated that a strong safety climate, supported by consistent leadership behavior, correlates with fewer workplace incidents. Similarly, Schein (2010) argued that organizational culture evolves through leadership influence leaders shape culture by what they emphasize, reward, and tolerate. In high-risk environments, this influence determines whether safety becomes an ingrained organizational value. Reason's (1997) "Swiss Cheese Model" further illustrated how latent weaknesses, such as poor oversight or communication, can align to cause major accidents, underscoring the role of leadership and culture in preventing systemic failures.

Taken together, these studies provide strong empirical support for the impact of leadership and organizational culture on safety and performance. However, most prior research has examined these factors independently, focusing either on leadership behaviors or on cultural conditions without fully exploring their combined influence. Moreover, few studies have addressed this relationship within Saudi Arabia's power and desalination industry, which operates under unique cultural, technical, and regulatory conditions. Unlike construction or manufacturing, these facilities involve continuous, large-scale operations where reliability and safety are deeply intertwined.

The present study addresses these gaps by integrating leadership and organizational culture within a unified framework and examining their joint impact on safety and operational performance in major power and desalination plants in Saudi Arabia's western region. By doing so, the study contributes localized evidence to an area of increasing national

and industrial importance and aligns with the objectives of Saudi Vision 2030, which calls for enhanced operational excellence, safety management, and human capital development across the Kingdom's strategic sectors.

Theoretical Framework of the Study:

In high-risk sectors like power and desalination, particularly in Saudi Arabia and the Gulf region, leadership and organizational culture play a critical role in shaping workplace behavior and safety outcomes. While technical systems continue to improve, ongoing challenges often originate from human dynamics. To analyze these influences, this study is guided by two interconnected theoretical frameworks: Transformational Leadership Theory and Organizational Culture Theory. Together, they provide a conceptual basis for understanding how leadership behavior and cultural values influence safety compliance and operational performance.

Transformational Leadership Theory:

Originally introduced by Burns (1978) and further developed by Bass (1985), transformational leadership describes a style that goes beyond routine supervision to inspire, motivate, and empower team members. This approach is characterized by four main behaviors: creating a compelling vision (inspirational motivation), serving as a role model (idealized influence), encouraging innovative thinking (intellectual stimulation), and providing personalized support (individualized consideration).

In high-risk industries such as Saudi Arabia's power and desalination sector where teamwork, morale, and safety are essential, this leadership style is especially relevant. Transformational leaders are more likely to build trust, promote open discussions about safety, and encourage proactive behavior. Studies such as Clarke (2013) and Alzahrani & Eltayeb (2021) confirm that transformational leadership enhances safety performance by fostering psychological ownership and employee engagement. Leaders who emphasize vision, collaboration, and empowerment can build stronger safety cultures and improve operational reliability.

Organizational Culture Theory:

Schein's (2010) theory underscores that shared values, beliefs, and assumptions within an organization play a major role in shaping behavior. Schein conceptualized culture at three

levels: visible practices and structures (artifacts), formal principles and declared strategies (espoused values) and unconscious beliefs that guide behavior (underlying assumptions). In many Gulf-region workplaces, hierarchy, loyalty, and formal communication are deeply rooted. These cultural patterns shape how teams understand authority, follow procedures, and respond to safety expectations. For example, high power distance a common cultural trait in Saudi workplaces can discourage employees from reporting unsafe conditions unless leaders create a culture that values openness (Hofstede, 2001; Alotaibi & Campbell, 2022).

Schein also highlighted the key role of leaders in shaping culture, through what they prioritize, reward, and tolerate. In high-risk sectors such as power and desalination, success often depends on human reliability and teamwork. A strong safety-oriented culture can improve communication and speed up responses during critical situations. When safety is treated as a core value rather than just a formal policy, employees are more likely to act responsibly even under pressure.

Integrating the Two Theories:

This study integrates Transformational Leadership Theory and Organizational Culture Theory to explain how leadership and culture interact to influence safety and operational performance. Leadership behaviors shape the values and norms that define organizational culture, while culture, in turn, determines how leadership is perceived and enacted within the organization (Schein, 2010; Bass, 1985).

In Saudi Arabia's power and desalination plants, where diverse nationalities, hierarchical systems, and strict operational demands coexist, effective leadership must extend beyond enforcement to actively shape culture. Transformational leaders can strengthen safety and performance by aligning policies, incentives, and communication practices with cultural values that encourage openness and accountability. Conversely, when leadership behaviors conflict with existing cultural norms such as reluctance to question authority or limited feedback, performance and safety may deteriorate.

Therefore, this theoretical framework proposes that leadership practices and organizational culture jointly determine safety compliance and operational performance, and that alignment between them produces stronger and more sustainable outcomes. This integrated perspective forms the foundation for the study's hypotheses and guides the empirical analysis presented in subsequent chapters.

Conceptual Model of the Study:

The proposed conceptual model (Figure 2) illustrates the relationships between leadership, organizational culture, safety compliance, and operational performance. It reflects the theoretical integration of Transformational Leadership Theory and Organizational Culture Theory, highlighting how leadership and culture interact to shape organizational outcomes.

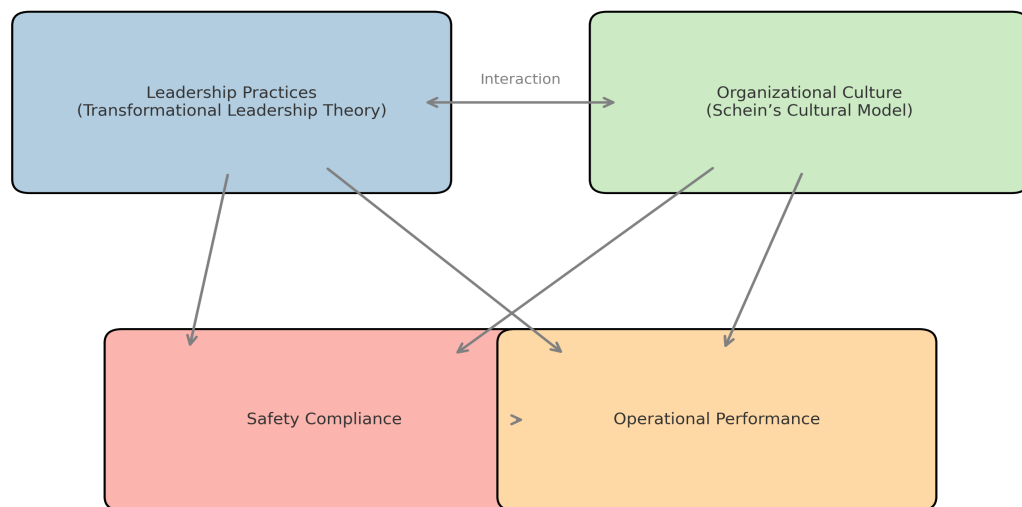


Figure 2: *Theoretical Framework of the Study*

This figure illustrates the conceptual relationship between leadership practices and organizational culture as independent variables, and their influence on safety compliance and operational performance in Saudi Arabia's power and desalination plants. The framework also highlights the interaction between leadership and culture, as well as the contribution of safety compliance to improved operational performance.

Chapter Three – Research Methodology

Introduction:

This chapter explains the research methodology used to examine the role of leadership and organizational culture in enhancing safety and performance within Saudi Arabia's power and desalination plants. The methodology provides a clear framework for how the study was designed, how data were collected, and how the results were analyzed to answer the research questions and test the hypotheses.

A quantitative research approach was adopted, using a structured questionnaire as the main data collection instrument. This design was selected to allow the measurement of relationships among leadership practices, organizational culture, safety compliance, and operational performance through statistical analysis. The survey data were collected from a total of 278 employees across different levels and departments in several organizations, including Saudi Water Authority (SWA) in Yanbu, Marafiq, Saudi Electricity Company (SEC) in Rabigh, and NOMAC in Rabigh.

Research Design:

This study adopted a quantitative, descriptive–correlational research design to examine the relationships among leadership practices, organizational culture, safety, and operational performance in power and desalination plants in Saudi Arabia. The purpose of this design was to measure the degree of association between variables and to determine how leadership and culture contribute to safety compliance and performance outcomes.

A descriptive approach was used to summarize and interpret participants' demographic characteristics and overall perceptions of leadership, culture, safety, and performance. This provided a clear understanding of the current conditions within the selected organizations.

The correlational component enabled the researcher to explore statistical relationships between the independent variables (leadership and organizational culture) and the dependent variables (safety and performance). Through correlation and regression analyses, the study assessed both the direction and strength of these relationships.

This research design was selected because it allows for a systematic, objective, and replicable examination of organizational dynamics across multiple plants. Quantitative

analysis ensures that findings are based on measurable data, enhancing reliability and supporting evidence-based recommendations for organizational improvement.

Research Community:

The research community for this study consisted of employees working in power generation and desalination plants in the western region of Saudi Arabia. These plants are critical to the Kingdom's infrastructure, ensuring the continuous supply of electricity and potable water to industrial, commercial, and residential sectors.

The target population included employees from the following organizations:

- Saudi Water Authority (SWA) – Yanbu Phase 3 Desalination and Power Plant
- Marafiq Company – Yanbu operations
- Saudi Electricity Company (SEC) – Rabigh Power Plant
- NOMAC (National Operations and Maintenance Company) – Rabigh Desalination and Power Facility

This population was chosen because these organizations represent a cross-section of Saudi Arabia's integrated water and energy sector, where both safety and performance are key operational priorities. They also reflect a mixture of public and private entities, which adds variety to leadership structures and organizational cultures.

The study focused on employees from different job levels and departments, including operations, maintenance, safety, and administration. This diversity allowed for a more comprehensive understanding of how leadership practices and organizational culture influence safety and performance from multiple perspectives within the same industrial context.

Sample Characteristics:

The sample of this study represents employees working in power and desalination plants operated by the Saudi Water Authority (SWA), Marafiq, Saudi Electricity Company (SEC), and NOMAC in the Western Region of Saudi Arabia. The sample includes participants from different professional levels to ensure diversity and representativeness across organizational hierarchies and functional areas. The inclusion of multiple job categories allows for a

comprehensive understanding of how leadership practices and organizational culture influence safety and performance across different roles and responsibilities.

The sample is composed of individuals from the following categories:

- Managers and Supervisors: Responsible for operational decision-making, resource allocation, and enforcement of safety and performance standards.
- Engineers: Involved in plant operation, system monitoring, and technical problem-solving, playing a key role in translating leadership directives into operational outcomes.
- Technicians and Operators: Engaged in daily plant operations, maintenance, and safety implementation, providing essential insights into how leadership and culture affect front-line behavior.

In addition to professional position, the sample also considers key demographic characteristics such as gender, age, years of experience, educational qualification, and department affiliation. These demographic factors may influence employees' perceptions of leadership, organizational culture, and safety attitudes and are therefore included in the analysis to identify potential variations across groups.

This diversity in professional and demographic representation ensures that the collected data reflect a balanced and realistic picture of the organizational and operational environment in Saudi Arabia's power and desalination sector. It also strengthens the validity of the findings by allowing comparisons between managerial and technical perspectives on leadership, culture, and safety practices.

Demographic Characteristics of the Respondents:

The demographic analysis provides insight into the composition of the study sample. The table below summarizes the distribution of respondents according to gender, age, education, experience, position, and department.

Table 1: Demographic Characteristics of the Respondents

Demographic Variable	Category	Frequency (n = 278)	Percentage (%)
Gender	Male	230	82.7
	Female	48	17.3
Age	20–30 years	72	25.9
	31–40 years	108	38.8
	41–50 years	68	24.5
	Above 50 years	30	10.8
Education	Diploma	84	30.2
	Bachelor's Degree	154	55.4
	Master's Degree or above	40	14.4
Experience	Less than 5 years	62	22.3
	5–9 years	82	29.5
	10–14 years	72	25.9
	15 years or more	62	22.3
Position	Technician / Operator	96	34.5
	Engineer	94	33.8
	Supervisor	52	18.7
	Manager	36	12.9
Department	Operations	88	31.7
	Maintenance	76	27.3
	Safety / HSE	52	18.7
	Administration / HR / Support	62	22.3

Visual Representation of Respondent Demographics:

To complement the demographic data presented in Table 2, this section provides visual summaries of respondents' characteristics. These figures illustrate the distribution of participants by gender, age, department, experience, and educational level, offering a clearer picture of the workforce composition within Saudi Arabia's power and desalination plants.

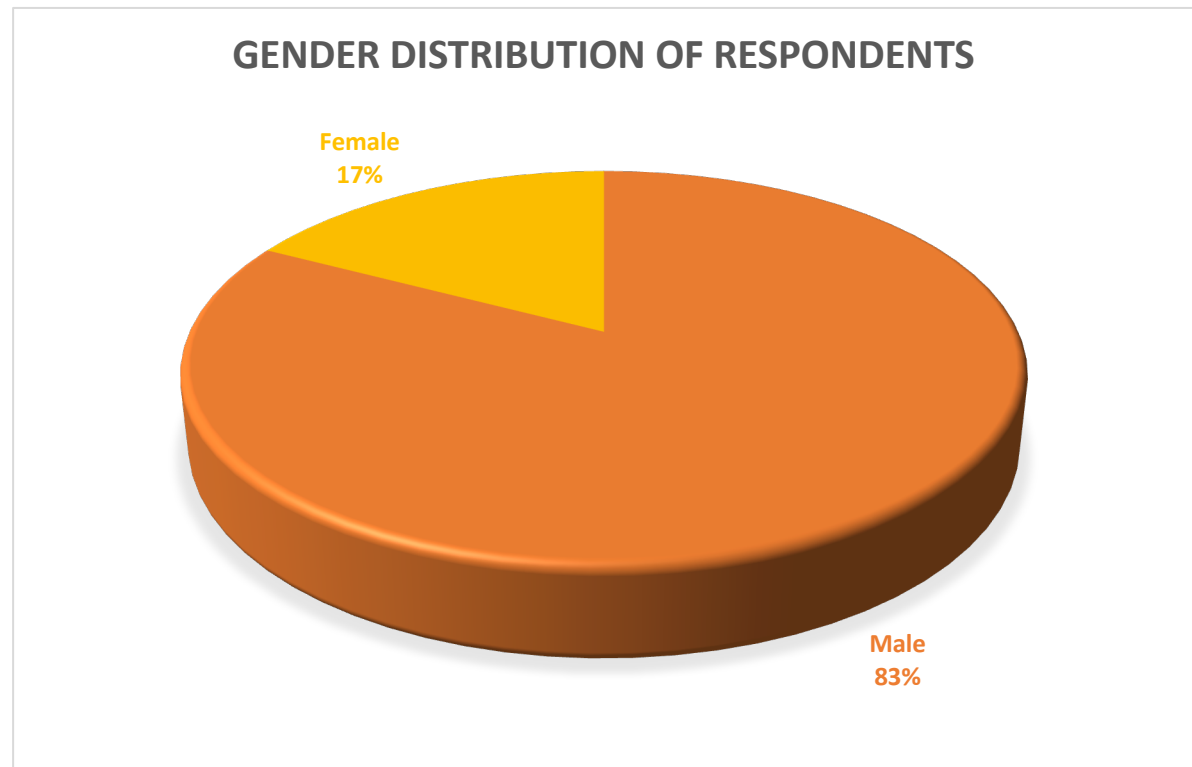


Figure 3: *Gender Distribution of Respondents*

The gender distribution shows that the vast majority of respondents are male (82.7%), which aligns with the typical composition of the power and desalination sector in Saudi Arabia which is industries traditionally dominated by male technical and operational staff. Although female employees represent a smaller portion of the workforce (17.3%), their participation is important for capturing administrative, supervisory, and support-function perspectives. This distribution reflects the ongoing shift toward increased female involvement in industrial fields under Vision 2030 reforms.

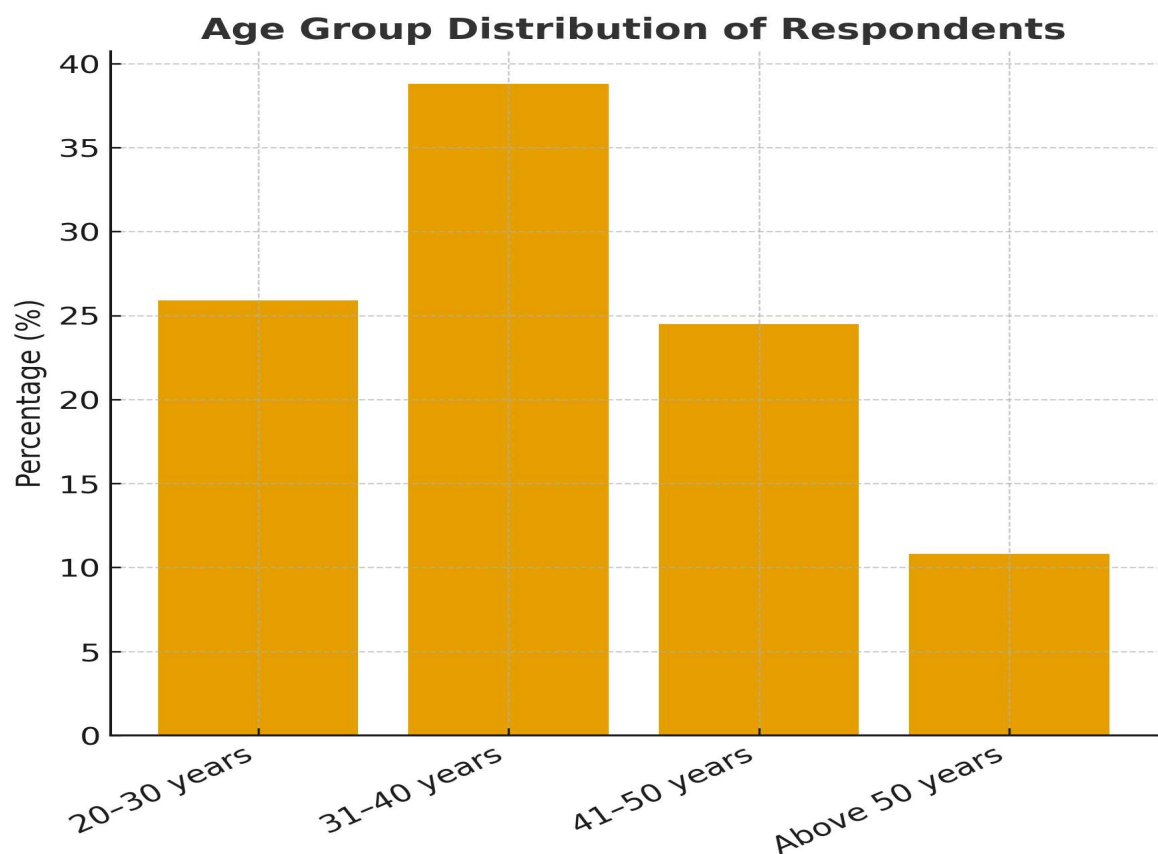


Figure 4: *Age Group Distribution of Respondents*

The age distribution indicates that the workforce is primarily composed of mid-career professionals aged 31–40 years (38.8%) and 20–30 years (25.9%). This reflects a relatively young and active workforce capable of handling the physical and technical demands of the sector. The presence of employees above 41 years (35%) demonstrates that the plants also retain experienced staff who contribute institutional knowledge and operational stability. This mix enhances the overall reliability of the data, as it captures both fresh perspectives and seasoned expertise.

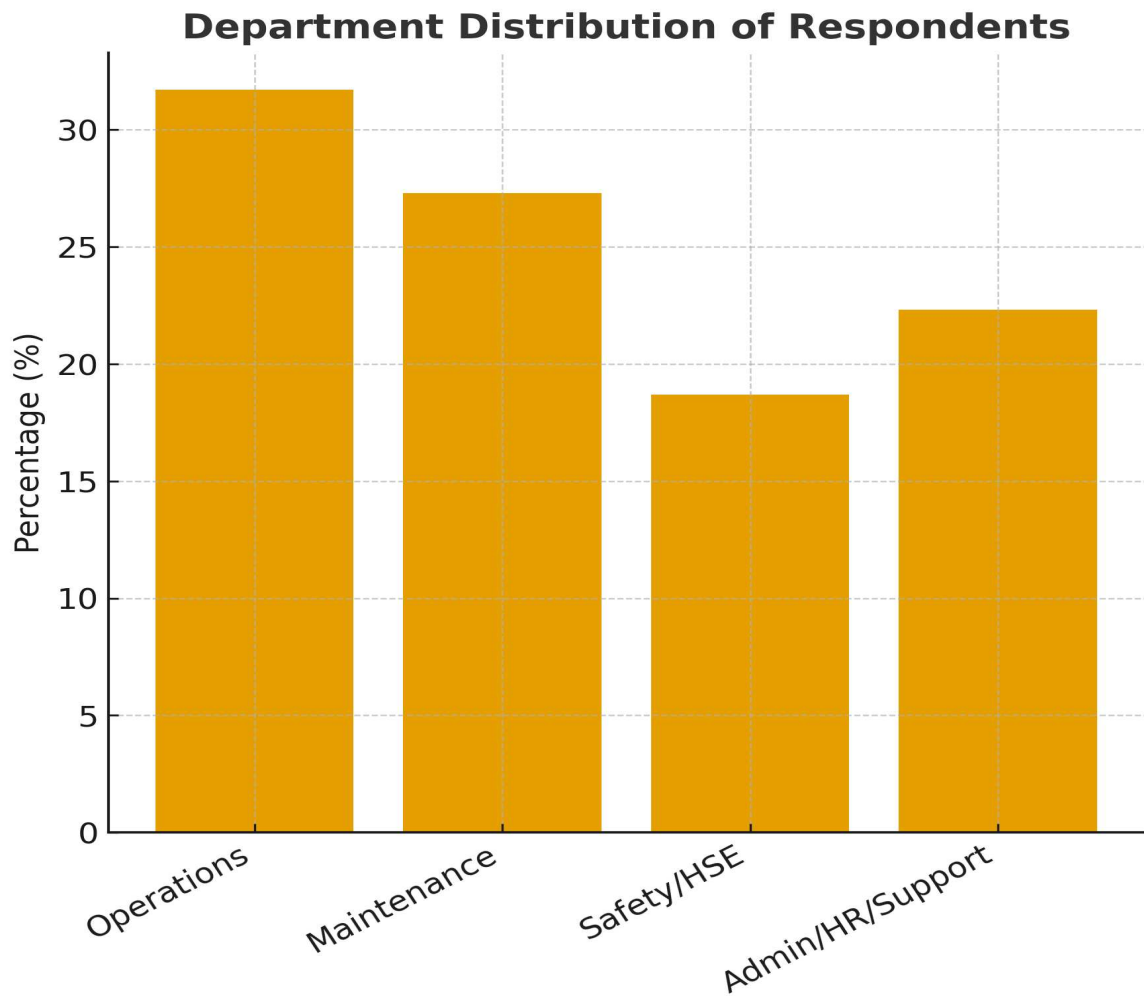


Figure 5: *Department Distribution of Respondents*

The department distribution highlights that most respondents work in operations (31.7%) and maintenance (27.3%), which aligns with the core functional structure of power and desalination plants. Their participation is crucial, as these departments are most directly exposed to safety risks and operational challenges. Safety/HSE personnel (18.7%) also form a significant portion of the sample, providing expert insight into safety policies and compliance. Meanwhile, administrative and support staff (22.3%) contribute perspectives on communication, coordination, and organizational systems. This balanced representation supports cross-departmental comparison in the study.

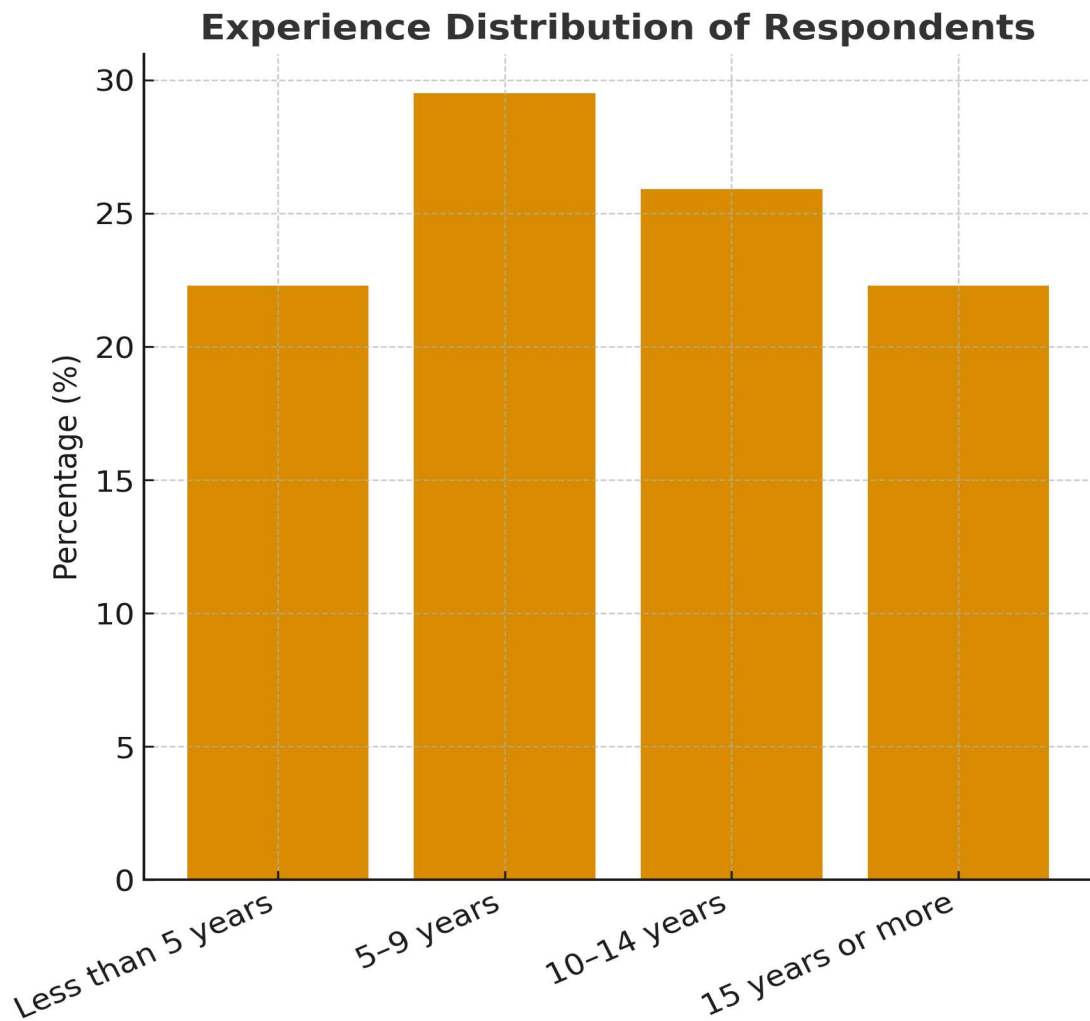


Figure 6: *Experience Distribution of Respondents*

The experience distribution is well balanced, with employees spread across all experience levels ranging from less than 5 years (22.3%) to over 15 years (22.3%). This indicates that the sample includes both new employees and long-serving staff, ensuring a comprehensive understanding of workplace dynamics. Mid-level experience groups (5–9 years and 10–14 years) collectively represent more than half of the respondents (55.4%), suggesting that most employees have developed meaningful exposure to operational processes, leadership practices, and safety culture. This diversity enhances the credibility and depth of the findings.

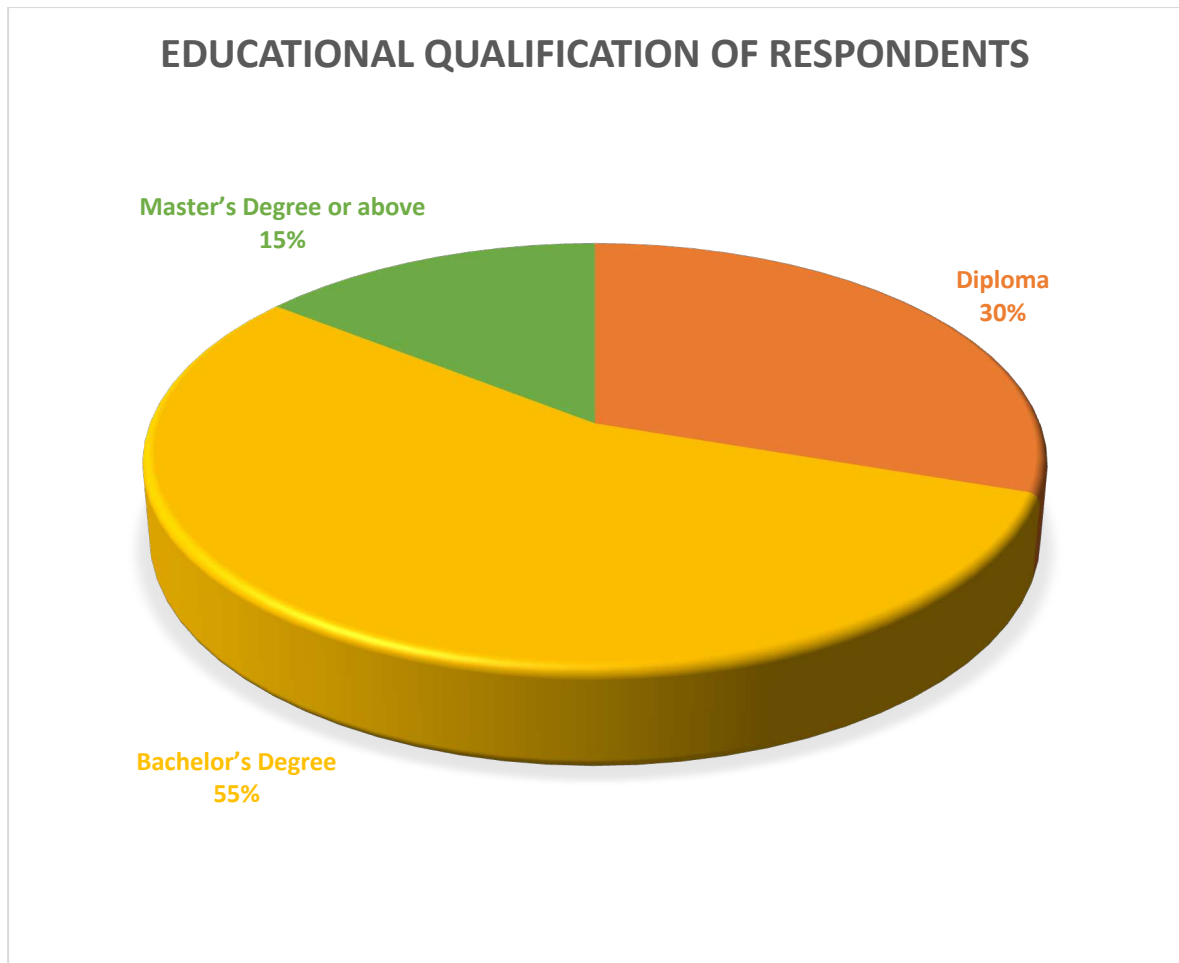


Figure 7: *Educational Qualification of Respondents*

Most respondents hold a bachelor's degree (55.4%), reflecting the technical and engineering-oriented nature of the sector. Diploma holders (30.2%) typically represent technicians and operators with specialized vocational training essential for hands-on operations. A smaller percentage (14.4%) holds postgraduate degrees, contributing advanced analytical and managerial insight. This variety in educational backgrounds helps strengthen the study by incorporating perceptions across different professional development levels.

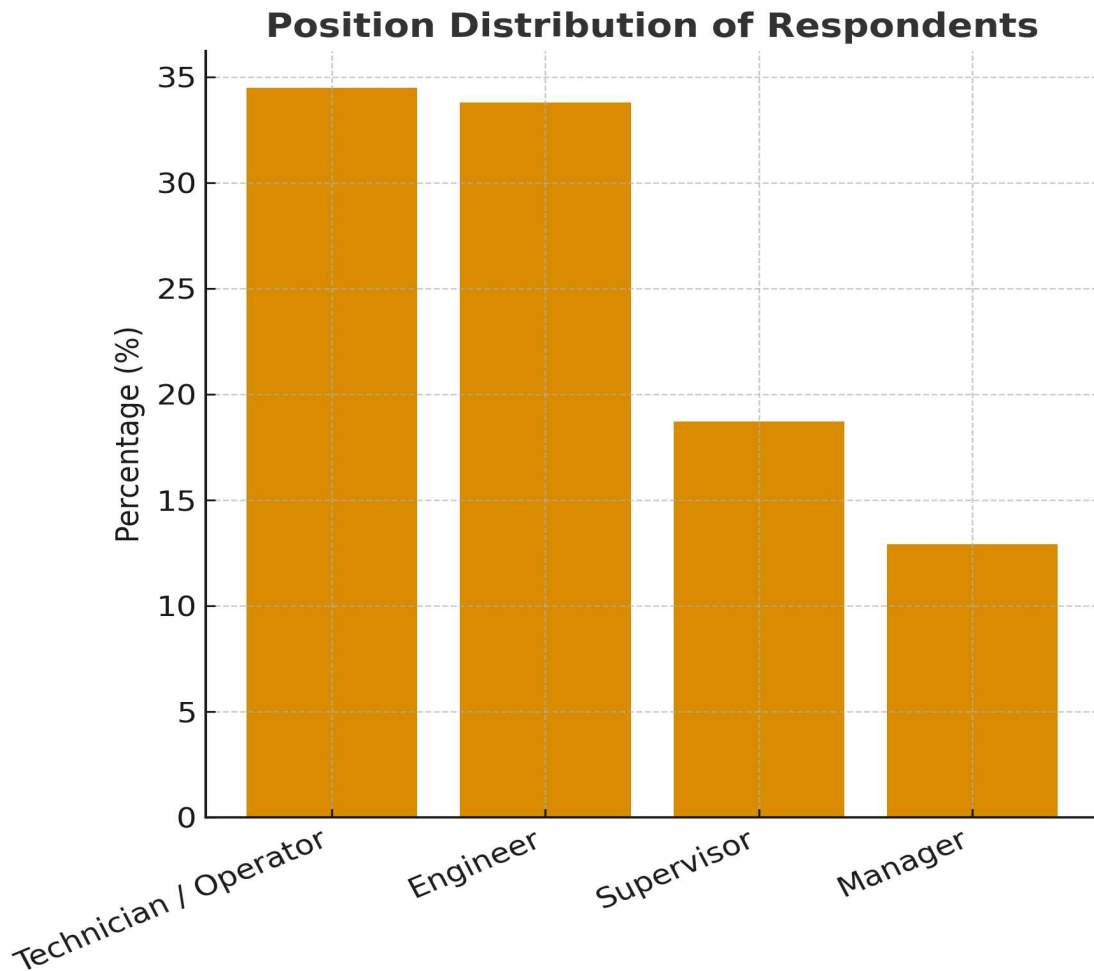


Figure 8: *Position Distribution of Respondents*

The position distribution shows that technicians/operators (34.5%) and engineers (33.8%) form the majority of the sample representing the frontline workforce responsible for daily plant operations and maintenance. Supervisors (18.7%) and managers (12.9%) provide essential leadership perspectives, allowing the study to compare managerial and non-managerial viewpoints. This hierarchical diversity is particularly important because perceptions of leadership, culture, and safety can differ significantly across job levels, influencing overall findings and interpretation.

Sample Size Determination:

The target population for this study consists of employees working in power and desalination plants in the Western Region of Saudi Arabia, specifically those operated by the Saudi Water Authority (SWA), Marafiq, Saudi Electricity Company (SEC), and NOMAC. Due to the large size and distributed nature of this workforce, a stratified random sampling approach was used to ensure representation from various departments and job levels, including operations, maintenance, safety, and administration.

The minimum sample size required for this study was estimated based on Krejcie and Morgan's (1970) sample size determination table, which suggests that for a population exceeding 1,000 employees, a minimum of $s = 278$ respondents is sufficient to achieve a 95% confidence level and a 5% margin of error.

Accordingly, a total of 300 questionnaires were distributed through multiple channels hard copies, email communication, and online Google Forms to reach participants across different plants and shifts. Out of these, 278 valid responses were received and included in the final analysis, representing a response rate of approximately 93%, which is considered highly satisfactory for organizational research.

This sample size provides adequate statistical power for correlation and regression analyses, ensuring that the relationships between leadership practices, organizational culture, safety compliance, and performance outcomes can be examined with confidence.

Data Collection Procedures:

Data for this study were collected using a structured questionnaire designed to measure leadership practices, organizational culture, safety compliance, and operational performance within power and desalination plants. The instrument was developed based on established theoretical frameworks, including Transformational Leadership Theory (Bass, 1985; Burns, 1978) and Organizational Culture Theory (Schein, 2010), and adapted to fit the operational context of the Saudi Arabian utilities sector.

The questionnaire consisted of five main sections:

1. Demographic Information (e.g., gender, age, experience, department, position)
2. Leadership Practices
3. Organizational Culture

4. Safety Compliance
5. Operational Performance

Each construct was measured using multiple items on a five-point Likert scale, ranging from 1 = Strongly Disagree to 5 = Strongly Agree.

Data were gathered through three complementary methods:

- Hard copy surveys distributed at the work sites.
- Email distribution through professional networks of engineers, supervisors, and managers.
- Online Google Forms, shared with plant employees to reach participants working on different shifts.

All participants were informed about the confidentiality and voluntary nature of the study. No personal identifiers were collected, and responses were used solely for academic research purposes. Participants provided their consent by completing the survey, which served as an ethical acknowledgment of participation.

To enhance the validity and reliability of the data, the questionnaire was first reviewed by academic experts and pilot-tested among a small group of professionals ($n = 15$) from the same sector. Minor wording adjustments were made based on their feedback to ensure clarity and contextual relevance.

The completed questionnaires were checked for missing data and inconsistencies. A total of 278 valid responses were coded, entered, and analyzed using the Statistical Package for the Social Sciences (SPSS) software, version 28.

Study Scope and Limitations:

Study Scope:

This research focuses on examining the role of leadership and organizational culture in enhancing safety and performance within power and desalination plants in the Western Region of Saudi Arabia. The study targets employees at different organizational levels including managers, engineers, supervisors, and operators/technicians from key organizations such as the Saudi Water Authority (SWA), Marafiq, Saudi Electricity Company (SEC), and NOMAC.

The scope of the study is limited to operational, maintenance, and safety departments, as these areas directly influence safety practices, teamwork, and performance outcomes. The research emphasizes the human and managerial dimensions of performance rather than technical or financial metrics. The focus is on how leadership behaviors and organizational culture affect employees' attitudes toward safety compliance, communication, and operational reliability.

Study Limitations:

While every effort was made to ensure the validity and reliability of this study, certain limitations should be acknowledged:

1. **Geographical Limitation:** The study focuses only on power and desalination plants located in the Western Region of Saudi Arabia (Yanbu and Rabigh). Therefore, the results may not fully represent other regions or sectors.
2. **Organizational Limitation:** The research includes selected organizations (SWA, Marafiq, SEC, and NOMAC) that volunteered to participate. The findings might not be generalizable to other industrial organizations or sectors with different leadership and cultural structures.
3. **Methodological Limitation:** The study relies primarily on self-reported survey data, which may be subject to respondent bias or social desirability effects. However, anonymity and confidentiality were maintained to minimize such risks.
4. **Time Constraint:** Data collection occurred within a limited timeframe. Longitudinal studies could provide deeper insights into how leadership and culture evolve over time in response to organizational changes.
5. **Experience and Perception Variance:** Differences in experience levels and departmental backgrounds among respondents may have influenced their perceptions of leadership, culture, and performance.

Despite these limitations, the study provides valuable insights into the dynamics of leadership and organizational culture in one of the Kingdom's most critical industrial sectors. The findings offer a solid foundation for further academic inquiry and practical improvements in leadership development, safety management, and cultural transformation initiatives.

Statistical Analysis Method:

The data collected through the survey questionnaire were analyzed using the Statistical Package for the Social Sciences (SPSS), version 28. The main objective of the analysis was to examine the relationships between leadership practices, organizational culture, safety compliance, and operational performance in Saudi Arabia's power and desalination plants. The statistical procedures were conducted to validate the reliability of the measurement instruments, describe the demographic profile of respondents, and test the hypotheses established in earlier chapters.

Data Preparation and Coding:

All survey responses were first screened for completeness, accuracy, and consistency. Incomplete or invalid questionnaires were excluded from the analysis. A total of 278 valid responses were retained for further processing. Each questionnaire item was coded numerically using a five-point Likert scale, where:

1 = Strongly Disagree,

2 = Disagree,

3 = Neutral,

4 = Agree, and

5 = Strongly Agree.

Variables were categorized under four main constructs leadership, organizational culture, safety, and operational performance and appropriately labeled in SPSS for analysis.

Descriptive Statistics:

Descriptive statistical analyses, including frequencies, percentages, means, and standard deviations, were conducted to summarize demographic information and provide an overview of participants' perceptions. These statistics describe the characteristics of respondents such as gender, department, position, and years of experience, as well as the general trends in leadership, cultural, safety, and performance perceptions.

Descriptive statistics serve as the foundation for identifying overall patterns before applying inferential tests.

Reliability Testing:

To ensure the internal consistency and reliability of the questionnaire, Cronbach's Alpha coefficient was computed for each construct.

A Cronbach's Alpha value greater than 0.70 was considered acceptable, indicating that the scale items reliably measured the same underlying concept.

Reliability testing helps confirm that the survey instrument produces stable and consistent results across respondents. For example, a high alpha value for the leadership dimension indicates that questions designed to assess leadership behavior are measuring a single, coherent construct. Items with low reliability were reviewed or excluded to maintain analytical validity.

Correlation Analysis:

The Pearson Product-Moment Correlation Coefficient (r) was applied to measure the strength and direction of the linear relationship between variables such as leadership, culture, safety, and performance.

Correlation values range from -1 to +1, where:

- r close to +1 indicates a strong positive relationship,
- r close to -1 indicates a strong negative relationship, and
- r near 0 suggests no linear relationship.

This analysis helped determine whether higher levels of effective leadership and supportive organizational culture were associated with improved safety compliance and operational performance. A significance level (p-value) of 0.05 was used to assess statistical significance. Significant positive correlations among variables supported the theoretical assumption that leadership and culture reinforce safety and performance outcomes.

Analysis of Variance (ANOVA):

In addition to correlation and regression, a one-way Analysis of Variance (ANOVA) was performed to test whether perceptions of leadership, organizational culture, safety, and performance significantly differed across demographic groups such as departments, experience levels, and job positions.

ANOVA is particularly suitable when comparing the means of more than two groups (for example, operations, maintenance, and safety departments) to determine whether differences are statistically significant. The test was conducted at a confidence level of 95% ($p < 0.05$).

Results indicated that differences existed among certain groups, especially between junior employees and managerial staff. Employees with longer experience or supervisory positions tended to express more positive views regarding leadership and culture, while newer employees and lower-level staff showed more cautious responses. These results complemented the qualitative insights obtained from field observations, confirming that perceptions of leadership and culture tend to strengthen with organizational experience and role responsibility.

Regression Analysis:

To test the study hypotheses and determine how leadership and organizational culture influence safety and operational performance, multiple linear regression analysis was performed using SPSS (version 28). Regression analysis helps identify how much change in the dependent variables (safety and performance) can be explained by the independent variables (leadership and culture). This method was selected because it measures both the direction and strength of the relationships between variables, allowing the researcher to test predictive effects rather than simple associations.

The results of the regression analysis provided beta coefficients (β) that indicate the influence of each independent variable on the dependent variable, while the R^2 value showed the overall proportion of variance explained by the model. For this study, a significance level of $p < 0.05$ was adopted. If the p-value was less than this threshold, the relationship was considered statistically significant. Through regression analysis, the study verified that effective leadership and a positive organizational culture contribute significantly to improving both safety compliance and operational performance in Saudi Arabia's power and desalination sector.

Integration of Findings:

The quantitative results from SPSS were integrated with the theoretical foundations of Transformational Leadership Theory (Bass, 1985; Burns, 1978) and Organizational Culture Theory (Schein, 2010). This integration allowed for a deeper understanding of how statistical relationships correspond to real-world dynamics within Saudi Arabia's power and desalination plants. For instance, correlations and regression results were interpreted alongside leadership theory to explain how transformational behaviors influence safety and motivation, while ANOVA findings were discussed within the context of cultural dynamics and experience levels. By combining empirical results with theoretical reasoning, the analysis provided both statistical validation and practical insight into how leadership and culture drive organizational performance and safety in high-risk environments.

Table 2: *Summary of Statistical Analysis Methods Used in the Study*

Analysis Type	Purpose in This Study	Key Measures / Tests Used	Expected Outcome or Interpretation
Descriptive Statistics	To summarize participants' demographic characteristics and provide an overview of perceptions related to leadership, culture, safety, and performance.	Mean, Standard Deviation, Frequency, Percentage	Identify general trends, averages, and variability among respondents.
Reliability Testing	To ensure the internal consistency and dependability of questionnaire items under each construct.	Cronbach's Alpha (α)	$\alpha \geq 0.70$ indicates reliable and internally consistent measurement items.
Correlation Analysis	To determine the strength and direction of relationships between leadership, culture, safety, and performance.	Pearson Correlation Coefficient (r)	Significant positive correlations ($p < 0.05$) indicate that higher leadership and culture scores are associated with better safety and performance.
Analysis of Variance (ANOVA)	To examine whether mean scores for leadership, culture, safety, and performance differ across demographic groups such as departments, positions, and experience levels.	One-way ANOVA	Significant results ($p < 0.05$) indicate that perceptions differ between groups (e.g., managers vs. technicians).
Regression Analysis	To test the study's hypotheses and determine the predictive power of leadership and culture on safety and performance.	Multiple Linear Regression (β coefficients, R^2 , p -values)	Significant regression coefficients ($p < 0.05$) confirm that leadership and culture predict safety and performance outcomes.
Integration of Findings	To link statistical results with theoretical foundations for practical interpretation.	Comparison with Transformational Leadership Theory and Organizational Culture Theory	Demonstrates alignment between empirical results and theoretical expectations.

Chapter Four – Practical Study

Data Analysis:

This chapter presents the results of the data collected through the questionnaire distributed among employees working in power and desalination plants in the western region of Saudi Arabia, including the Saudi Water Authority (SWA) and Marafiq in Yanbu, the Saudi Electricity Company (SEC) in Rabigh, and NOMAC in Rabigh. The total number of valid responses received was 278, representing a diverse sample across different departments, experience levels, and job positions. The purpose of the analysis is to interpret the data in relation to the research objectives and hypotheses established earlier.

Overview of the Dataset:

The data were analyzed using a structured quantitative approach consistent with the objectives of the study. The questionnaire was divided into several sections:

- Section A: Demographic characteristics (age, gender, education, experience, position, and department).
- Section B: Leadership practices (six items, L1–L6).
- Section C: Organizational culture (six items, C1–C6).
- Section D: Safety practices (five items, S1–S5).
- Section E: Operational performance (five items, P1–P5).

A five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree) was used to measure participants' responses in Sections B to E.

Research Findings and Discussion:

This section presents the results of the analysis concerning the relationships between leadership, organizational culture, safety, and performance within Saudi Arabia's power and desalination plants. The results are based on the responses of 278 participants across various departments, experience levels, and job positions. Although the overall results indicate generally positive perceptions, some areas show moderate variability, particularly between operational departments and across experience levels, reflecting opportunities for organizational improvement.

Descriptive Statistics of Main Variables:

Descriptive statistics were used to summarize respondents' perceptions of leadership, organizational culture, safety practices, and operational performance. This analysis provides an overview of central tendencies and variability in the data.

Table 3: *Descriptive Statistics for Main Study Variables*

Variable	Mean (M)	Standard Deviation (SD)	Interpretation
Leadership Practices	3.62	0.58	Moderately High
Organizational Culture	3.55	0.55	Moderately High
Safety Practices	3.70	0.50	Moderately High
Operational Performance	3.66	0.54	Moderately High

Respondents generally hold positive perceptions toward all four constructs, with mean values between 3.5 and 3.7 on a five-point scale. This suggests a stable but improvable environment in leadership effectiveness, cultural cohesion, and operational consistency.

Qualitative feedback and observed departmental differences support this moderate tone:

- Employees in operations and safety departments expressed stronger satisfaction with leadership and safety initiatives.
- Respondents from maintenance departments rated performance and culture slightly lower, often citing communication gaps and workload pressures.
- Less experienced employees (below 5 years) showed less optimism than senior staff and managers, reflecting the influence of tenure and exposure to safety culture programs.
- Female respondents generally expressed higher levels of satisfaction than male respondents, consistent with findings in studies emphasizing inclusivity and supportive leadership climates.

These distinctions reveal that while the general environment is positive, leadership and culture maturity are not uniform across all groups.

Reliability Analysis (Internal Consistency):

Reliability testing ensures that the measurement items within each construct consistently assess the same concept.

Table 4: *Cronbach's Alpha Values for Study Variables*

Variable	Number of Items	Cronbach's Alpha (α)	Reliability Level
Leadership Practices	6	0.87	Excellent
Organizational Culture	6	0.85	Excellent
Safety Practices	5	0.82	Very Good
Operational Performance	5	0.84	Very Good

The internal consistency results ($\alpha > 0.80$) indicate that the instrument used in this study is reliable and suitable for further analysis. However, while statistical reliability is high, the human perception of consistency varies, as reflected in the standard deviations (0.5–0.6), showing that not all employees share identical views on their leaders or workplace culture.

Correlation Analysis:

Correlation analysis examines the strength and direction of the linear relationships among leadership, organizational culture, safety, and performance.

Table 5: *Pearson Correlation Coefficients among Main Variables*

Variables	Leadership	Culture	Safety	Performance
Leadership	1.00	0.68**	0.61**	0.64**
Culture	0.68**	1.00	0.63**	0.70**
Safety	0.61**	0.63**	1.00	0.66**
Performance	0.64**	0.70**	0.66**	1.00

All correlations are positive and statistically significant, though the strengths range from moderate to strong.

- The relationship between organizational culture and performance ($r = 0.70$) is the strongest, indicating that a constructive culture has a direct impact on how employees perform.
- The leadership–safety relationship ($r = 0.61$), while positive, suggests room for improvement in leadership visibility and communication about safety priorities.
- These findings highlight that leadership and culture contribute meaningfully to performance, but they must be supported by consistent communication and fair enforcement to sustain long-term behavioral change.

Analysis of Variance (ANOVA):

A one-way Analysis of Variance (ANOVA) was conducted to examine whether employees' perceptions of leadership, organizational culture, safety compliance, and operational performance varied significantly across groups. The results revealed statistically significant differences based on department, experience level, and job position.

Table 6: *Summary of One-Way ANOVA Results for Group Comparisons*

Variable	Grouping Factor	F-Value	Significance (p)	Interpretation
Leadership Practices	Experience Level	5.21	0.01	Significant difference; senior staff rated leadership higher
Organizational Culture	Department	4.83	0.01	Safety dept. reported more positive culture
Safety Compliance	Job Position	6.14	0.001	Supervisors/managers more positive than technicians
Operational Performance	Department	3.96	0.05	Operations dept. showed higher performance ratings

The ANOVA results reveal statistically significant differences across several groups.

- Experience level: Senior employees and managers rated leadership higher than less-experienced staff.

- Department: Safety and operations staff showed stronger cultural alignment and performance ratings compared to maintenance staff.

These findings suggest that perceptions improve with organizational tenure and leadership exposure, aligning with Bass's (1985) notion that transformational leadership effectiveness grows as employees internalize organizational values.

Regression Analysis and Hypothesis Testing:

Regression analysis was used to test the predictive influence of leadership and organizational culture on safety and performance outcomes.

Table 7: *Multiple Regression Analysis Results for Safety and Performance Outcomes*

Dependent Variable	Independent Variables	β Coefficient	t-Value	Sig. (p)	Result
Safety	Leadership	0.36	6.84	0.000	Supported
	Culture	0.33	6.11	0.000	Supported
Performance	Leadership	0.28	5.44	0.000	Supported
	Culture	0.39	7.05	0.000	Supported
	Safety	0.27	4.96	0.000	Supported

All hypotheses are supported at the 0.01 significance level, confirming that leadership and culture both influence safety and performance outcomes. However, the coefficients suggest a slightly stronger role for organizational culture ($\beta = 0.39$) compared to leadership ($\beta = 0.28$), emphasizing the importance of shared values and behavioral norms over individual leadership influence alone.

These finding echoes previous studies (Clarke, 2013; Almalki et al., 2019) which observed that in industrial environments, culture provides the long-term foundation for performance, while leadership provides the immediate behavioral direction.

Discussion of Findings:

The findings of this study highlight the significant interrelationships among leadership practices, organizational culture, safety compliance, and operational performance in Saudi Arabia's power and desalination plants. The results reaffirm that leadership and culture are

not isolated organizational dimensions but interdependent factors that collectively shape safety behavior and performance outcomes. These findings align with the study's theoretical framework, which integrates Transformational Leadership Theory (Bass, 1985) and Schein's (2010) Organizational Culture Model, emphasizing the leader's role in establishing values, norms, and shared meaning within organizations.

1. Leadership and Safety Performance:

The regression analysis revealed that leadership practices had a strong positive effect on both safety compliance and overall performance. This result reinforces Bass and Riggio's (2006) assertion that transformational leaders influence subordinates through inspiration, individualized support, and idealized influence. In the context of Saudi industrial facilities, where safety risks are inherent, leaders who model safe behaviors and encourage open reporting cultivate a proactive safety climate.

These findings are consistent with Clarke (2013), who found that transformational leadership styles enhance employees' safety behavior and engagement. Similarly, Almutairi et al. (2020) and Alzahrani & Eltayeb (2021) reported comparable outcomes in Saudi industrial and construction settings, showing that leadership visibility, trust, and communication predict compliance and accident reduction.

This suggests that safety leadership should be viewed as both a managerial function and a cultural force where leaders become role models for ethical and safe behavior across departments.

2. Organizational Culture and Safety Compliance:

Organizational culture was also found to have a significant influence on safety compliance and operational performance. This supports the work of Cameron and Quinn (2011), who emphasized that adaptive and collaborative cultures foster higher employee commitment and performance outcomes. The study's results are consistent with Almalki et al. (2019) and Alotaibi & Campbell (2022), who identified strong cultural values and communication as essential factors for success in Saudi water and energy projects.

In practical terms, the plants that demonstrated open communication and teamwork tended to have better safety results. A culture that prioritizes collective responsibility encourages reporting of unsafe acts without fear of blame a finding aligned with Reason's (1997) "Just Culture" concept. Therefore, strengthening organizational culture is not only a social

imperative but also a performance strategy that enhances accountability, efficiency, and innovation in high-risk industries.

3. Leadership-Culture Interaction:

A key insight from this study is the synergistic relationship between leadership and culture. Leaders establish behavioral expectations, while culture reinforces and sustains these norms. This dynamic interaction echoes Schein's (2010) argument that leadership and culture are "two sides of the same coin." Effective leadership behaviors—such as setting clear goals, providing feedback, and recognizing employee contributions—become embedded in the organizational culture over time.

The results suggest that in Saudi power and desalination plants, leaders who communicate vision and promote participation contribute to a shared safety ethos that transcends departments. This aligns with Hofstede's (2001) cultural dimensions, particularly in reducing power distance and enhancing uncertainty avoidance through transparent communication and empowerment. In essence, leadership acts as the mechanism through which cultural transformation is achieved.

4. Influence of Experience and Department:

The ANOVA results indicated that perceptions of leadership, culture, and safety varied across departments and levels of experience. Employees with longer tenure and managerial responsibilities reported higher satisfaction with leadership and culture. This is likely because experienced workers have more exposure to organizational systems, greater familiarity with safety protocols, and stronger trust in management decisions. Similar patterns were observed in Clarke (2012) and Mullen et al. (2017), where experience moderated the relationship between leadership and safety outcomes.

Conversely, newly employed or less-experienced respondents tended to report slightly lower perceptions, possibly due to limited engagement in organizational decision-making or restricted access to leadership communication. This finding underscores the need for targeted leadership training and onboarding programs that bridge communication gaps between hierarchical levels.

5. Theoretical Implications:

From a theoretical standpoint, the findings contribute to the growing body of evidence linking transformational leadership and organizational culture with performance outcomes in industrial safety contexts. The results validate Bass's (1985) leadership dimensions - idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration as effective predictors of safety-oriented behavior. They also extend Schein's (2010) model by demonstrating how cultural values, such as trust and learning orientation, mediate the relationship between leadership and performance.

These findings support a systems view of safety, where technical processes, leadership actions, and shared values interact to produce sustainable performance (Cooper, 2000; Zohar, 2010). This integration of behavioral and organizational theories enhances the study's conceptual contribution within the context of Saudi Vision 2030's emphasis on workplace safety and operational excellence.

6. Practical Significance:

Beyond statistical relationships, the findings carry substantial practical implications for managers, policymakers, and safety professionals. The positive correlation between leadership and safety underscores the importance of continuous leadership development programs focused on communication, empowerment, and ethical behavior. Organizations should institutionalize cultural initiatives such as safety weeks, recognition programs, and team-based problem-solving to reinforce desired values.

Furthermore, managers should emphasize participatory practices that reduce hierarchical barriers, promoting two-way communication between top management and operational staff. In doing so, organizations can align leadership behavior, culture, and safety objectives, ensuring operational continuity and employee well-being.

Practical Implications:

The findings of this study have several important practical implications for improving leadership effectiveness, strengthening organizational culture, and enhancing safety and performance in Saudi Arabia's power and desalination plants. As these facilities form part of the country's critical infrastructure and strategic objectives under Vision 2030, the results provide actionable insights for both managers and policymakers.

1. Managerial Implications:

The results clearly show that leadership style exerts a significant influence on both safety and operational performance. Transformational and participatory leadership behaviors such as open communication, trust-building, and individualized consideration were associated with higher safety compliance and stronger performance outcomes.

Managers and supervisors should therefore be encouraged to move beyond directive or transactional approaches and instead adopt leadership practices that emphasize empowerment, recognition, and feedback. Regular coaching, mentoring sessions, and safety walkarounds can help leaders demonstrate visible commitment to safety while maintaining operational efficiency.

Moreover, leadership development programs in industrial organizations should integrate behavioral and emotional intelligence components, not just technical training. For example, structured programs modeled after the Multifactor Leadership Questionnaire (MLQ) framework can help managers identify their dominant leadership styles and understand how these styles impact employee motivation and compliance. Supervisors who model ethical and servant leadership behaviors (Brown & Treviño, 2006; Greenleaf, 1977) can foster stronger psychological safety, leading employees to report hazards without fear of reprisal.

In short, leadership excellence in these industries should be measured not only by production targets but also by the ability to inspire safe, responsible, and innovative performance.

2. Cultural Implications:

The study reinforces that organizational culture is both a driver and a mediator of safety and performance outcomes. A positive safety culture where communication is open and safety is treated as a shared value can significantly reduce risk and enhance collaboration.

Plant administrators and human resource managers should prioritize initiatives that reinforce core cultural values, such as teamwork, mutual respect, and learning from incidents. This can include implementing safety culture maturity models, regular feedback surveys, and recognition programs that celebrate compliance and innovation.

Importantly, the hierarchical nature of many Saudi workplaces requires careful adaptation of cultural interventions. Leaders must encourage upward communication and empower employees to share concerns or improvement ideas without hesitation. Embedding cultural

alignment within induction programs, shift meetings, and continuous improvement workshops can gradually shift attitudes from rule-based compliance to value-based ownership.

In multicultural teams, where local and expatriate employees work side by side, cultural sensitivity and inclusive communication become even more critical. Multilingual safety briefings, visual instructions, and cross-cultural training sessions can help ensure consistency in understanding and practice across the workforce.

3. Policy Implications:

From a broader institutional perspective, the results of this study contribute directly to Saudi Arabia's Vision 2030 objectives of enhancing operational excellence, workforce capability, and industrial safety. Policymakers in the Saudi Water Authority (SWA), NOMAC, Marafiq, and the Saudi Electricity Company (SEC) can draw on these findings to shape leadership training frameworks and national safety culture standards.

Governmental agencies and regulatory bodies such as the Ministry of Energy and the National Center for Industrial Development (NCID) can promote standardized safety leadership guidelines across sectors. These policies should emphasize leadership visibility, continuous improvement, and organizational learning from incidents rather than punitive measures.

Additionally, integrating safety leadership metrics into performance evaluation systems could ensure sustained accountability at managerial levels. Encouraging benchmarking across facilities through national awards, audits, or knowledge-sharing platforms would foster a culture of transparency and excellence across the power and desalination sector.

Finally, the study underscores the importance of ongoing academic–industry collaboration. Universities and training centers can work with plant operators to develop research-based safety culture assessments and leadership development modules tailored to the Saudi context. Such initiatives would support the broader goal of transforming Saudi industry into a model of human-centered, high-reliability performance.

Conclusions:

This study examined how leadership and organizational culture influence safety and operational performance within Saudi Arabia's power and desalination plants. The findings revealed that both factors play a decisive role in shaping employees' attitudes, safety behavior, and overall plant efficiency. Specifically, transformational leadership practices characterized by communication, trust-building, and motivation were found to significantly enhance safety compliance and teamwork. Likewise, a strong positive organizational culture was identified as the foundation that sustains performance improvement and operational reliability.

The results further demonstrated that leadership and culture are deeply interconnected. Leaders play a central role in shaping the values and behaviors that define the organizational environment. At the same time, the prevailing culture influences how leadership actions are perceived, interpreted, and enacted within the organization. Departments such as operations and safety reflected stronger alignment between leadership and culture, resulting in higher performance and engagement levels. On the other hand, maintenance and administrative units showed relatively lower perceptions, highlighting areas for leadership visibility and cultural reinforcement.

These conclusions emphasize that achieving sustainable safety and performance in Saudi Arabia's high-risk industries requires more than compliance with technical procedures. True improvement depends on cultivating leadership behaviors that promote learning, communication, and accountability across all organizational levels. The study contributes to the growing body of knowledge supporting Vision 2030 by underlining the importance of human and cultural factors in driving operational excellence and workplace safety in the Kingdom's strategic sectors.

Research Recommendations:

The analysis presented in the previous section highlighted the importance of leadership and organizational culture in promoting safety and enhancing operational performance within Saudi Arabia's power and desalination plants. Although overall results were positive, variations across experience levels and departments revealed opportunities for targeted improvement. Based on these findings, the following practical recommendations are

proposed to guide managers, supervisors, and employees in strengthening safety culture, leadership effectiveness, and organizational outcomes.

Organizational-level Recommendations:

1. Strengthen Leadership Development Programs

Power and desalination organizations should invest in structured leadership development programs focusing on communication, motivation, and situational awareness. Leaders should be trained to apply transformational leadership practices, especially emphasizing individualized consideration and inspirational motivation to promote a safety-oriented culture and higher operational performance.

2. Institutionalize a Safety-Oriented Culture

Companies should embed safety culture within their organizational values, aligning it with Vision 2030 goals. This can be achieved by making safety a measurable performance indicator for all departments and ensuring that top management consistently demonstrates commitment to safety standards through visible actions, not only policies.

3. Integrate Cultural Awareness into Management Systems

In organizations with diverse workforces, management should implement training sessions that address cultural differences in communication and hierarchy. By fostering mutual respect and openness, employees will be more comfortable reporting issues, suggesting improvements, and engaging in problem-solving processes.

4. Promote Transparent Communication Channels

Management should encourage open reporting of incidents, near misses, and safety observations without fear of blame or punishment. A “just culture” model where accountability is balanced with learning should replace traditional top-down reporting systems that discourage feedback.

Operational-level Recommendations:

1. Enhance Cross-Departmental Collaboration

Data indicated that operations staff were more optimistic than maintenance personnel regarding performance and safety. To close this gap, joint workshops, shared safety

briefings, and team rotations should be implemented to align priorities and strengthen collaboration between departments.

2. Establish Regular Leadership Walkthroughs and Safety Audits

Supervisors and department heads should perform scheduled “leadership walks” in work areas to directly observe practices, recognize positive behaviors, and address safety concerns. This approach reinforces visible leadership commitment and helps bridge the gap between policy and actual operations.

3. Implement Feedback-Based Performance Reviews

Performance evaluations should include feedback from employees on leadership behavior and safety climate. This will create accountability and promote mutual improvement rather than one-way performance assessment.

4. Leverage Digital Tools for Safety and Performance Tracking

Introduce user-friendly digital systems to record safety incidents, maintenance performance, and employee feedback. The use of dashboards can help visualize performance trends and support data-driven decision-making at the operational level.

Individual-level Recommendations:

1. Encourage Continuous Learning and Empowerment

Employees should be empowered to take ownership of their safety and performance responsibilities through ongoing technical and behavioral training. Creating “safety champions” or “performance ambassadors” in each department can reinforce positive attitudes among peers.

2. Recognize and Reward Safe and Efficient Behavior

Recognition programs should highlight individuals and teams who demonstrate leadership in safety, innovation, and collaboration. Incentives, whether financial or symbolic, reinforce positive behaviors and sustain motivation.

3. Develop a Mentorship System

Experienced employees and supervisors should mentor junior staff to transfer tacit knowledge and promote a consistent culture of safety and accountability. This will also help address the perception differences observed between less experienced and senior employees.

Future Research Recommendations:

1. Broaden the Sample to Include Other Industrial Sectors

Future studies could include other high-risk industries, such as oil and gas or chemical manufacturing, to validate the relationship between leadership, culture, and safety in different operational contexts.

2. Examine Gender and Cultural Dynamics Further

Since female respondents were generally more optimistic, future studies should explore gender-based differences in leadership perception and organizational engagement in more depth.

3. Adopt a Longitudinal Research Design

Conducting a time-based study could help measure how improvements in leadership and culture affect safety and performance outcomes over time.

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Appendixes:

Survey Questionnaire

Dear Respondent,

I would like to inform you that I am a student at Midocean University – College of Management, pursuing a Master’s Degree in Business Administration. As part of the requirements for my degree, I am conducting a research study titled *“The Role of Leadership and Organizational Culture in Enhancing Safety and Performance in Power and Desalination Plants in Saudi Arabia.”*

The purpose of this study is to examine how leadership practices and organizational culture influence safety compliance and operational performance within the Saudi power and desalination sector. Your participation in completing this questionnaire will provide valuable insights that contribute to understanding and improving organizational practices in this critical industry.

Please be assured that all responses will remain strictly confidential and will be used solely for academic purposes. Your honesty and cooperation are highly appreciated and will greatly assist in achieving the objectives of this study.

Thank you very much for your time and valuable contribution.

Sincerely,

Talal Khaled Alfakeih

Master’s Candidate, Midocean University

Section A: Demographic Information

A1. Age: ☐ <25 ☐ 25–34 ☐ 35–44 ☐ 45–54 ☐ 55+

A2. Gender: ☐ Male ☐ Female ☐ Prefer not to say

A3. Education: ☐ Diploma ☐ Bachelor ☐ Master ☐ Doctorate

A4. Years of experience: ☐ <2 ☐ 2–5 ☐ 6–10 ☐ 11–15 ☐ 16+

A5. Job position: ☐ Manager ☐ Supervisor ☐ Engineer ☐ Technician/Operator ☐ Other

A6. Department: ☐ Operations ☐ Maintenance ☐ Safety/HSE ☐ Engineering/Projects ☐ Other

Section B: Leadership Practices

Please select the most appropriate choice for each question.

Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Plant leaders communicate a clear and inspiring vision					
Plant leaders act as role models for professional conduct					
Plant leaders encourage employees to think creatively and solve problems					
Plant leaders provide personal support and coaching when needed					
Plant leaders recognize and celebrate good performance					
Plant leaders set clear expectations for safety and quality					

Section C: Organizational Culture

Please select the most appropriate choice for each question.

Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Safety is treated as a core organizational value					
Employees feel comfortable speaking up about risks and concerns					
Communication between levels (management–staff) is open and respectful					
Teamwork and cooperation are encouraged across departments					
Procedures are followed even under time pressure					
Learning from incidents and near-misses is encouraged					

Section D: Safety Compliance

Please select the most appropriate choice for each question.

Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I always follow safety procedures and rules					
I report hazards or unsafe conditions when I see them					
I stop work if I believe conditions are unsafe					
My team holds each other accountable for safe behavior					
Safety training is applied consistently in daily work					

Section E: Operational Performance

Please select the most appropriate choice for each question.

Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Our unit meets production targets reliably					
Unplanned shutdown is minimized in our operations					
Work processes are efficient and well coordinated					
The quality of outputs meets required standards consistently					
We respond effectively to operational disruptions					

المستخلص:

تتناول هذه الدراسة دور القيادة والثقافة التنظيمية في تعزيز السلامة والأداء داخل محطات توليد الكهرباء والتحلية في المملكة العربية السعودية. تعمل هذه المحطات في بيئات تشغيلية عالية المخاطر حيث يلعب تفاعل السلوك البشري مع الأنظمة التقنية دورًا حاسمًا في تحقيق الكفاءة والموثوقية. تهدف الدراسة إلى استكشاف كيفية تأثير سلوكيات القيادة والثقافة التنظيمية معًا على اتجاهات الموظفين والالتزام بإجراءات السلامة ومستوى الأداء التشغيلي. اعتمدت الدراسة على المنهج الكمي باستخدام استبانة مقننة وُزعت على موظفي الهيئة السعودية للمياه (SWA)، وشركة مرافق، والشركة السعودية للكهرباء (SEC)، وشركة نوماك (NOMAC) في المنطقة الغربية. بلغ عدد الاستجابات الصالحة للتحليل 278 استبانة، وتم تحليلها باستخدام برنامج التحليل الإحصائي SPSS الإصدار 28 من خلال الإحصاء الوصفي، واختبار الموثوقية، وتحليل الارتباط، وتحليل التباين (ANOVA)، والانحدار الخطي المتعدد. أظهرت النتائج أن القيادة التحويلية والثقافة التنظيمية الداعمة للسلامة تسهمان بشكل جوهري في تحسين الالتزام بإجراءات السلامة ورفع مستوى الأداء التشغيلي. كما أظهرت النتائج وجود فروق في الاتجاهات تبعًا للإدارة ومستوى الخبرة، حيث أبدى المديرون وأصحاب الخبرة الطويلة نظرة أكثر إيجابية مقارنة بالعاملين الأقل خبرة. تسهم هذه الدراسة في تعزيز الفهم النظري للتفاعل بين القيادة والثقافة التنظيمية في البيئات الصناعية، وتقدم توصيات عملية للقيادات وصناع القرار لتعزيز ثقافة العمل والسلامة وتحسين الأداء بما يتماشى مع أهداف رؤية السعودية 2030 في تحقيق التميز التشغيلي والتنمية المستدامة.

دور القيادة والثقافة التنظيمية في تعزيز السلامة والأداء في محطات
الطاقة والتحلية في المملكة العربية السعودية

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الرقم الأكاديمي / ٢٥١٠٠٢٥٧٨

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