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HOW SAFETY LEADERSHIP STYLES IMPACT EMPLOYEE SAFETY BEHAVIORS

by

Michelle McRae Payne

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree

Of

Doctorate in Business Administration

In the Robinson College of Business

Of

Georgia State University

GEORGIA STATE UNIVERSITY

ROBINSON COLLEGE OF BUSINESS

2023

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## ACCEPTANCE

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**ABSTRACT**

How Safety Leadership Styles Impact Employee Safety Behaviors

by

Michelle McRae Payne

April 2023

Chair: Peter Zhang

Major Academic Unit: Doctorate in Business Administration

Job-related injuries continue to be a salient problem facing many organizations. Achieving zero recordable injuries in the workplace is something that many companies endeavor to accomplish. Prior research has examined the role of leadership in influencing and improving workplace safety. However, studies of safety leadership have focused on the styles or behaviors of leaders without taking into account the influence of context on leader activities or practices. In this research, I perform a multi-case study with in-depth analyses of how different leadership styles impact employee safety behaviors and safety performance. The research settings are two manufacturing facilities within a large consumer products company that have excellent safety performance. The results suggest that different leadership styles influence employee safety behaviors (specifically, safety compliance and safety participation) and safety performance. The study also reveals the mechanisms through which transactional leadership, transformational leadership, and leader-member exchange impact safety performance via the following safety antecedents: unified safety vision, motivational role modeling, knowledge management, policies and procedures, recognition and rewards, and safety resourcing. It adds to prior research that multiple leadership styles contribute to employee safety behaviors and overall workplace safety in different ways. The study answers the call for more safety research regarding contextual

antecedents within a specific context that drive successful safety performance by identifying factors that shape positive employee safety behaviors. It also provides insights on how organizational training programs can be designed to develop effective safety leadership.

INDEX WORDS: safety, leadership style, transformational, transactional, leader-member exchange, employee safety behaviors.

## 1 INTRODUCTION

Accomplishing and maintaining an injury-free workplace can be a daunting challenge for organizations as workplace injuries and illnesses continue to be a disconcerting problem, according to recent occupational health and safety data. The Bureau of Labor and Statistics (BLS) published in November 2021 that employers reported 2.7 million non-fatal workplace injuries and illnesses in 2020 ([www.bls.gov](http://www.bls.gov), 2020). There were 4,764 fatal work injuries recorded in the United States during 2020. Company data reported to BLS during 2020 showed 1,176,340 non-fatal injuries and illnesses, which caused an employee in general industry to miss at least one day of work ([www.bls.gov](http://www.bls.gov), 2020). In 2020, the median number of days away from work due to illnesses and injuries (including job transfers and restricted work activity) in all private industry occupations was 12 days which is an increase from 8 days in 2019 ([www.bls.gov](http://www.bls.gov), 2020). As of 2021, based on data reported by selected industries released by the Bureau of Labor and Statistics, the manufacturing sector remains the second highest contributor to non-fatal occupational injuries and illness ([www.bls.gov](http://www.bls.gov), 2020). U.S. businesses spend more than one billion dollars weekly on serious, non-fatal workplace injuries ([Liberty Mutual Insurance, 2018](#)). From a global perspective, fatalities and illnesses have also occurred associated with work-related events. According to the International Labor Organization ([ILO, 2022](#)), "two million women and men die each year as a result of occupational accidents and work-related diseases. Across the globe, there are 270 million occupational accidents and 160 million occupational diseases each year." The ILO (2022) has also estimated that "four percent of the world's Gross Domestic Product (GDP) is lost due to accidents and work-related diseases."

Achieving zero incidents in the workplace is something that many companies across the country strive to accomplish. Incidents are any unforeseen or unplanned events resulting in injury,

illness, death, chemical spill, property damage, or environmental harm. One of the core notions for consideration is that workplace incidents are preventable. Incidents can be costly to businesses because of worker's compensation claims and the negative impacts on production output. Figure 1 shows the estimated economic costs of work-related deaths and injuries in 2020, compiled by the National Safety Council (NSC). The total work injury costs in 2020 were \$163.9 billion, which includes \$44.8 billion for wage and productivity losses, \$34.9 billion for medical expenses, and \$61.0 billion associated with administrative expenses. Note that NSC's cost estimates represent income not received or expenses incurred due to fatal and non-fatal preventable injuries. Although these costs reflect the impact on society (not simply on employers), it is evident that the costs associated with employee injuries (for example, lost productivity and medical expenditure) can be a compelling motivation for management within companies to seek means for injury and illness prevention in the workplace.



**Figure 1 Worker injury costs during 2020 as reported by the National Safety Council.**

[Work Injury Costs - Injury Facts \(nsc.org\)](https://www.nsc.org/work-injury-costs-injury-facts)



## **1.1 Leadership and Safety**

Management within organizations strives to create workplaces free of incidents, injuries, and illnesses. These negative events not only have the potential to lead to physical harm, but they can also add unnecessary burdens associated with grief, financial costs, low morale, stress, and hardships for employers and employees. Negligence resulting in an incident with physical injury to a worker can potentially lead to worker's compensation claims, regulatory fines, lawsuits, and financial implications. Each of these scenarios can severely impact a company's growth and damage the organization's reputation. Serious incidents resulting in worker injury or death can also cause financial and emotional hardship to the employee's family.

Injuries in the workplace are the consequences of unsafe behaviors or conditions. Unsafe employee behaviors can negatively impact the individual, co-workers, the business, the community, or even society depending on the magnitude of the incident. The mission to have safer workplaces requires support from the entire organization, especially top management. Although commitment starts with top management, it is also necessary for employees to align with company values and priorities related to safety. Leaders and employees are two key aspects of creating safe work environments.

Leadership is an essential component of the occupational health and safety management system, and it influences and shapes workplace safety development and improvement (Day, 2014). Managers can positively affect safety outcomes by articulating a clear vision and mission for safety, motivating the workforce to achieve it, acting as role models, and showing genuine concern for employees. Leaders can motivate employees to work harder, follow established procedures, comply with policies, attain goals and standards, and take ownership of safety performance. Senior and middle management are typically responsible for instilling values within an organizational culture, thereby significantly influencing personnel behavior (Roughton et al., 2019).

Management establishes the organization's strategic direction while communicating the importance of occupational safety initiatives. Leadership ensures the resources required to organize, accomplish, maintain, and optimize health and safety work programs. It becomes apparent to employees what leadership sees as important by the allocation of funding, time, and effort. Eventually, employees will align with this prioritization, and the leader's behavior is transferred to others throughout the company. Due to leadership being vitally important to employee safety within the workplace, it is worth considering avenues for further research about the relationship between leadership and safety performance.

There have been studies about leadership and its influence on employee behaviors in safety. Yule and Flin (2004) conducted a limited literature review on leadership for safety in the industrial sector. They found that managers and supervisors have both a direct and indirect impact on employee behaviors. The indirect effects pertain to establishing norms and codes of conduct relating to practices and procedures, thereby establishing a particular type of safety culture. The direct effect is revealed through managers and supervisors modeling safe or unsafe behaviors and reinforcing subordinate behaviors through monitoring and enforcing accountability. Xue et al. (2020) employed safety questionnaires to examine the relationship between senior managers' leadership and employee safety behavior in the petrochemical industry in China. They found that senior managers in the petrochemical industry with transformational leadership styles, as exemplified by safety concern and safety vision, have a more active role in enhancing employee safety behavior than senior managers with a transactional leadership style. Specifically, safety concern was the most significant predictor of establishing safety compliance, while safety vision emerged as a significant predictor for safety participation.

Multiple research studies have been conducted on leadership behaviors and competencies

that influence safety outcomes. Lekka et al. (2012) conducted a literature review to identify specific leadership styles, behaviors, attitudes, and practices that represent effective leadership for safety. They showed transformational leadership and transactional leadership to be two of the most promising leadership styles. Recent studies have also demonstrated leadership styles, as mediated by goal commitment or intrinsic motivation, to be critical for managing occupational hazards (; Conchie, 2013; DeArmond et al., 2018). Transformational and transactional leadership have been identified as promising catalysts to promote safer business operations (Inness et al., 2010; Lai et al., 2020; Martinez- Córcoles and Stephanou, 2017).

## **1.2 Research Question and Approach**

This research aims to examine how upper and middle management's leadership impacts employee safety behavior and workplace safety at a global medical device company. Specifically, we address the following research question: How do management leadership styles affect employee safety behavior that leads to an injury-free workplace? An in-depth examination of the influence of leadership on safety behavior and performance is essential because, despite a good amount of research done in this area, there is no general consensus regarding how different leadership styles impact various safety behaviors and what leadership styles are most influential. Donovan et al.'s (2016) literature review of the influence of leadership styles on safety outcomes shows there is a lack of understanding about how leadership emerges and supports safety management. They find that most of the existing research is carried out predominantly through survey questionnaires and "may prevent a full understanding of safety leadership, the factors underpinning it, and how it interacts with other behaviors" (Donovan et al., 2016, p. 425). As a result, it may produce "minimal exploration of additional factors and elements across organizational systems such as procedures, policies, systems, and processes" (Donovan et al., 2016, p. 425).

As an in-depth examination of safety leadership within a specific context is important (Denis et al., 2010; Osborn et al., 2002; Porter and McLaughlin, 2006), a case study approach is adopted in this research. The case study setting is a global consumer products manufacturer specializing in consumable goods, equipment, and instruments. It operates in over 50 countries with multiple manufacturing sites across the world. Between 2018 and 2022, the company reported an average of 129 recordable injuries annually. The company's two locations were selected for this study due to their excellent safety performance in recent years. Site A, located in Indonesia, is one of the company's largest manufacturing facilities, with approximately 1,050 full-time employees and the only one with no recordable workplace injuries from 2018 to 2021. Site B is a mid-sized manufacturing facility with approximately 260 full-time employees located in Germany, and it achieved no recordable workplace injuries for three years between 2020 and 2022. The safety records of these two facilities contrasted notably with those of other sites, where multiple worker injuries were experienced during the same timeframe.

### **1.3 Study Overview**

An engaged scholarship framework (Mathiassen, 2017; Van de Van, 2007) is used to guide the research design and analysis. Mathiassen (2017, p. 18) pointed out that "engaged scholarship calls for designing two inter-related documents from the very start: one that explicates the key components of the research and one that describes the structure of the resulting publication." Table 1 and Table 2 provide a summary of the components of the engaged scholarship framework for this research. These two tables have been developed for the multi-case study to aid the research process. The tables served as a foundation for the research and guided subsequent review and revisions required as the study evolved. The conceptual framing for safety presented in Table 1 proposes two key components: management's safety leadership and employee safety behaviors

(specifically safety compliance and safety participation) as primary explanatory drivers for improved safety performance. The framework identifies transactional and transformational leadership styles as aspects for driving safety outcomes. Prior research supports these two leadership styles as significantly impacting workplace safety performance.

Table 1 identifies the structure for engaged scholarship study. The research question is raised based on the fact that occupational incidents resulting in injuries remain a prevalent and salient problem for companies ([www.ilo.org](http://www.ilo.org)). Management's visible and consistent commitment to safety leadership in the workplace is essential to improve safety performance and reduce injuries and fatalities. More specifically, management's leadership style affects employee safety behaviors differently. There is a growing body of literature in the area of organizational safety. In particular, research studies investigate the factors that influence and drive safety performance (Bass, 1990; Barling et al., 2002; Bian et al., 2019). These studies support the importance of management's safety leadership to improve employee safety behaviors and safety outcomes in the workplace. Table 2 shows the structure for engaged scholarship publication. The table provided a roadmap to transition dissertation research into content for publication. Development of the various sections was an iterative process whereby revisions were made throughout the research study as discoveries were made, data recorded and analyzed, and results transcribed.

**Table 1 Research Design (Mathiassen, 2017)**

<i>Component</i>	<i>Definition</i>	<i>Specification</i>
<b>Journal</b>	The target journal defines the audience for your research and the conversation you seek to join	Safety Science, Journal of Safety Research, Journal of Operations Management, Journal of Occupational Health Psychology
<b>Title</b>	The title expresses the essence of your research design with emphasis on C	How Safety Leadership Styles Impact Employee Safety Behaviors: A Multi-Case Study
<b>P</b>	The problem setting represents people's concerns in a real-world problematic situation	Occupational fatalities and injuries have been a salient problem worldwide for many decades. Management's visible and consistent commitment to safety leadership throughout all areas within organizations is essential to improve safety performance and reduce workplace injuries and fatalities. Various leadership styles may play different roles on employee safety behaviors.
<b>A</b>	The area of concern represents some body of knowledge within the literature that relates to P	A growing body of research in the area of organizational safety, more specifically the factors which influence and drive safety performance, supports the importance of management's safety leadership as a significant lever to improve employee safety behaviors and safety outcomes in the workplace.
<b>F</b>	The conceptual framing helps structure collection and analyses of data from P to answer RQ; F <sub>A</sub> draws on concepts from A, whereas F <sub>I</sub> draws on concepts independent of A	The theoretical framing for Safety proposes two key concepts namely, management's safety leadership and employee safety behaviors (specifically safety compliance and safety participation) as primary explanatory drivers for improved Safety Performance. The framework identifies leadership styles, Transactional Leadership and Transformational Leadership theories, as key components to driving safety outcomes. Prior research supports these two leadership styles as significantly impacting workplace safety performance. Theory of leadership styles: specifically how two major leadership styles (Transformational and Transactional) impact worker behaviors, resulting in outstanding safety outcomes.
<b>M</b>	The adopted method of empirical inquiry	Interpretive holistic multi-case study to examine how and why two particular sites within a global medical device company could achieve an injury-free workplace whereas other sites have not been successful. Within Alcon, unique phenomenons of two extreme cases for exemplary safety performance exist which require more in depth understanding. Out of 25 sites globally, there have only been two sites that have had no recordable injuries for three or more consecutive years. These two sites are Batam, Indonesia (large manufacturer with 1,200 employees) and Erlangen, Germany (mid-size manufacturer with 270 employees). Elaborate why a case study is appropriate for this research and the procedures used to collect the data and perform analysis.
<b>RQ</b>	The research question relates to P, it opens for research into A, and it helps ensure the research design is coherent and consistent	How do upper-level management and middle-level management leadership styles affect employee safety behaviors (specifically safety compliance and safety participation) and consequently safety performance?
<b>C</b>	The contributions to P and A and possibly to F and M	Contribution to A: This study aims to advance our understanding of leadership styles and their roles in safety behaviors and safety outcomes. Contribution to F: This study aims to develop a framework that links leadership styles, employee safety behaviors and safety outcomes. Contributions to P: Lessons on how managers can effectively lead to achieve safer workplace by using different leadership styles to influence employee safety. behaviors.

**Table 2 Structure for Engaged Scholarship Publication (Mathiassen, 2017)**

Component	Definition	Specification
Title	Express the essence of the research with emphasis on contribution (C).	How Safety Leadership Styles Impact Employee Safety Behaviors: A Multi-Case Study
Abstract	Provide the basic argument based on problematic situation (P), area of concern (A), conceptual framing (F), research method (M) and C.	Introduce the importance of transformational and transactional safety leadership on employee safety behaviors and company safety performance (P) and how multiple leadership styles working together have been rarely examined (A) in a case study setting (M). Provide a brief description of the safety leadership concepts and theoretical framing which serves as a foundation for this study (F) by synthesizing how safety leadership impacts employee behavior based upon existing research. An interpretive multiple case study will be the approach used to examine how and why two particular sites within a global company achieved injury-free workplaces whereas other sites were not as successful (M). The case study research will yield important insights with implications for Alcon as a business and safety in general industry (C).
Introduction	Introduction A and the motivation for the study. Introduce P, F, and M as appropriate for addressing the RQ. State principal results by making clear how C contributes to P and A.	Start with a discussion about workplace safety, occupational work-related fatalities, and injuries and why it is an important business problem. Lay the foundation for the research motivation and focus which is how transformational safety leadership and transactional safety leadership (F) impacts employee behaviors and safety performance. Discuss the specific issues the research is examining, existing knowledge, research methods (M), and potential contributions to occupational injuries (P) and workplace safety (A).
Background	Present a review of extant literature on A. Substantiate the motivation for the study by evaluating what we know and don't know about A. Construct and articulate the opportunity to make a contribution and substantiate the choice of the RQ.	Summarize what we know about workplace safety, transactional safety leadership, transformational safety leadership, and employee behaviors (A) in order to establish a foundation and the motivation for the dissertation research. A review of prior relevant literature will be utilized to establish existing knowledge about "transactional safety leadership", "transformational safety leadership" and the impact on "employee behaviors" and "safety performance" (A). The literature review will help identify critical knowledge gaps (P), highlight the body of literature (A) to which the research will make a contribution (C) to address something we don't currently know, and articulate the importance of the problem (P) by providing examples of its impact as documented in previous research publications. This information will be leveraged to substantiate the question (RQ) "How do upper-level management and middle-level management leadership styles affect employee safety behaviors (specifically safety compliance and safety participation) and consequently safety performance?"
Framing	Introduce and argue for an existing, revised, or developed F (FA and FI) as a means for structuring data collection and analysis.	The theoretical framing for Safety proposes two key concepts namely, management's safety leadership and employee safety behaviors (specifically safety compliance and safety participation) as primary explanatory drivers for improved Safety Performance. The framework identifies leadership styles, Transactional Leadership and Transformational Leadership theories, as key components to driving safety outcomes. Prior research supports these two leadership styles as significantly impacting workplace safety performance. Theory of leadership styles: specifically how two major leadership styles (Transformational and Transactional) impact worker behaviors, resulting in outstanding safety outcomes.
Methods	Describe and argue for M. Introduce P to provide context for analysis. Detail and argue for approach to data collection and analysis to respond to RQ.	Interpretive holistic multi-case study to examine how and why two particular sites within a global medical device company could achieve an injury-free workplace whereas other sites have not been successful. Within Alcon, unique phenomenons of two extreme cases for exemplary safety performance exist which require more in depth understanding. Out of 25 sites globally, there have only been two sites that have had no recordable injuries for three or more consecutive years. These two sites are Batam, Indonesia (large manufacturer with 1,200 employees) and Erlangen, Germany (mid-size manufacturer with 270 employees). Elaborate why a case study is appropriate for this research and the procedures used to collect the data and perform analysis.
Results	Present results of data analysis- based on F <sub>i</sub> , following M, and to help answer RQ. Focus on appropriate structuring of analysis and use tables and graphs. Establish empirical foundation to make contribution.	Present the major findings of the study. Include the results of the research questions and what additional insights were discovered. Demonstrate the impact of different leadership styles, Transformational Leadership and Transactional Leadership, on associate behavior resulting in strong safety performance. Tables and figures will be used to present empirical evidence and a theoretical model emerged from data analysis.
Discussion	Explain and argue for contribution to P (C <sub>p</sub> ) and A (C <sub>a</sub> ) as response to RQ, based on results and background literature. Don't just repeat results. Discuss relationships to literature, explain conclusions with evidence for each conclusion, provide alternative explanations, and state theoretical and practical implications.	Discuss the contribution to Transformational and Transactional safety leadership theory. Convey the implications of findings and refute alternative explanations to our findings as well as limitations of our method and analysis. Share the practical implications as well as the lessons learned at the Wavelight and Batam sites that can be used within the Alcon community and the overall safety field for general industry.

#### **1.4 Organization of the Dissertation**

The rest of the dissertation is organized as follows. Chapter II provides a literature review on three leadership styles exhibited at Site A and Site B that were identified as having influences on employee safety behaviors in the workplace. It also provides the conceptual framing, which helped to structure collection and analysis of the data to address the research question for this study. Chapter III discusses the methodology for empirical inquiry, and Chapter IV reports the findings from the two case studies. Chapter V expounds on the results section by offering implications for theory, implications for practice, research limitations, and considerations for future research.



## 2 LITERATURE REVIEW

Safety in the workplace presents a series of challenges for management at multiple levels. At the individual level, workers are encouraged to adhere to safety policies and procedures while taking part in social interactions that promote a safer work environment. At a department and team level, managers and supervisors are expected to spend a portion of their time setting objectives, monitoring employee behaviors, offering feedback, implementing corrective actions when warranted, and administering rewards to recognize exemplary safety behaviors. At an organizational level, managers and supervisors responsible for helping individuals in the company understand that safety is prioritized, valued, and supported to build a sense of well-being and trust within and external to the company. Management is accountable for establishing safety initiatives that contribute to the business's overall success. In addition to influencing employee behaviors, management is also responsible for ensuring the integrity and proper functionality of equipment, machinery, and systems in the workplace.

In addition, researchers have elucidated that human behaviors associated with safe working coupled with organizational strategies enhance worker knowledge and skills to help promote workplace safety (DePasquale and Geller, 1999). Employee behaviors are an indicator to management about the norms that are a part of day-to-day work practices. Employee safety behaviors contribute to safety outcomes over time. Gaining insights into the factors that impact employee safety behaviors and performance, which serve as precursors to occupational injury avoidance, can foster improvements in workplace safety (Neal and Griffin, 2006).

Leaders have a vital role in promoting safety-related activities in the workplace. Leadership commitment to safety is a significant facet that influences the effectiveness of internal safeguards and contributes to an organization's safety outcomes. Research conducted by Kapp (2012) indicated that the style of leadership demonstrated by front-line supervisors positively

impacts the safety behaviors of subordinates. Leadership style is the "relatively consistent pattern of behavior that characterizes a leader" (DuBrin, 2016, p. 124). Clark (2013) conveyed that safety leadership is an essential antecedent of safety behavior. The research conducted by Shore et al. (2020, p. 156) found that "leadership plays an important role in creating a positive work environment around safety and health." Workers can be very perceptive about how leadership values employee safety within an organization. Employees can observe, perceive, and attest to management's commitment toward safety when it is evident in the workplace. Employees understand explicitly where leadership stands related to safety when they establish their commitment through conduct and practices to ensure the integration of safety in everyday operations. Some examples include:

- management ensuring that employee personal protective equipment is procured, readily available, and easy to use;
- capital investments in machine guarding and safety interlocks and controls on equipment to protect workers; and
- inspiring employees to consistently achieve targets for leading safety key performance indicators.

Safety being valued by leadership, in turn, results in the development of a positive mindset and a sense of well-being in employees. Management safety practices improve conditions within the company by positively influencing employee mindsets and behaviors (DePasquale and Geller, 1999). When employees see that management is committed to safety, employees tend to comply with safety within the organization (Griffin and Neal, 2000).

## 2.1 Transformational and Transactional Leadership

Two of the most commonly explored leadership styles indicated as workplace safety influencers include transformational and transactional leadership. Burns (1978) first introduced

the concept of transformational leadership. Transformational leadership encompasses four main behaviors. According to Inness et al. (2010, p. 280), "*Idealized influence* is when leaders demonstrate high standards of moral conduct in their own behavior. *Inspirational motivation* occurs when leaders communicate a positive, value-based vision for the future state of the organization and its employees. *Intellectual stimulation* is when leaders encourage employees to challenge organizational norms and think creatively. Lastly, *individual consideration* is leaders recognize the unique needs of followers." Later Bass (1985) further built upon Burns' work by expounding that transformational leaders convince employees to believe in the company's values and mission and influence them to go above and beyond to make a difference within the organization by offering feedback, inspiration, and encouragement. Bass (2008) defined the four aspects of transformational leadership as

- (1) *Idealized Influence* – inspiring trust and acting as a role model;
- (2) *Inspirational Motivation* – offering an attractive shared vision of the future;
- (3) *Intellectual Stimulation* – fostering non-traditional problem-solving techniques, and
- (4) *Individual Consideration* – paying careful attention to subordinates' unique needs.

Transformational leaders inspire followers to excel and perform beyond expectations (Yukl, 2001). The extant literature also indicates that transformational leadership plays an essential role in motivating employees to be committed to their work, thus resulting in better job performance (Bass and Riggio, 2006; Lai et al., 2020; Tims et al., 2011).

Transactional leadership was first introduced by Max Weber in 1947 and then followed by Bass in 1981 as he began to develop the Full Range of Leadership model (Duemer, 2017). Transactional leadership "maintains organizational stability through regular social exchanges, leading to goal achievement for both leaders and their followers" (Arenas, 2019, p. 3). There are

three dimensions of transactional leadership, which include Management by Exception – Active (MBE-A), Management by Exception – Passive (MBE-P), and Contingent Reward (CR) (Judge and Piccolo, 2004). Contingent reward refers to the degree to which a leader establishes constructive transactions or exchanges with followers. The leader clarifies expectations and indicates rewards for meeting these expectations. Management by exception is the degree to which the leader implements corrective action based on the results of the leader-follower transactions. Active leaders monitor and are aware of follower behavior, anticipate problems, and take corrective actions as needed before the behavior creates adverse outcomes. On the contrary, passive leaders wait until the behavior has created problems before acting to correct it. However, Bass and Riggio (2006) identified three slightly different categories of transactional leadership: *contingent reward*, *management-by-exception (MBE)*, and *laissez-faire leadership*. According to Bass and Riggio (2006), *contingent reward* leadership involves the leaders assigning or obtaining buy-in from followers on what needs to be done with a commitment or actual rewards rendered in exchange for satisfactorily completing the assignment. Whereas with active *MBE*, the leader arranges to actively monitor employee behaviors for deviations from established policies and procedures, such as mistakes and errors in the follower's assignments, to take corrective action as necessary. *MBE passive* implies waiting inattentively for deviances, mistakes, and errors to occur and then taking corrective action whenever a problem arises. *Laissez-faire* leadership avoids addressing issues or represents the absence of leadership (non-transaction). In adopting an engaging transactional leadership style for safety, leaders typically establish appropriate safety goals, monitor performance towards these goals, and reward behaviors that sustain or improve safety practices (Kapp, 2012; Zohar, 2002a, 2002b).

In contrast to transformational leadership, transactional leadership focuses on day-to-day activities and processes to promote an injury-free workplace while conducting business. Transactional leaders demonstrate behaviors related to constructive and corrective actions. Bass (1985) elaborated that contingent reward is essential to this constructive interchange between management and employees. One example of contingent reward is when an engineering manager sponsors a team celebration for the successful fabrication and installation of a production line without any workers being injured. In exchange for a desirable outcome, the leader offers a tangible item or commendations as a reward. Recognitions and rewards in the workplace can include congratulations, compliments, acknowledgments, applause, merit increase, bonus, spot awards, prizes, and other employee benefits. Bass (1990) denoted management-by-exception active as a means by which leaders course correct or enforce corrections. This is accomplished by managers engaging in routine monitoring of work, proactive detection of variations in work tasks, and prompt resolution.

Review of the literature has revealed that less research has been undertaken on the impact of transactional leadership (when compared with transformational leadership) and its specific effects on safety performance in the workplace. An extensive number of researchers have explored transformational leadership because it is arguably expected to be more impactful than transactional leadership in various work environments. Previous studies indicate that transformational leaders inspire and strongly influence employee performance by enhancing individualized identification with the leader, emphasizing worker value to the organization, and exceeding expectations for the organization's benefit (Bass et al., 1987; Kark and Shamir, 2002). Martinez and Stephanou (2017) developed a novel integrated structural model which showed the impact of transactional leadership on three dimensions of safety performance. The three dimensions of safety performance included

safety compliance, safety participation, and risky behaviors. A study by Kapp (2012) similarly indicated that the contingent reward aspect of transactional leadership positively impacted safety outcomes. Results specifically related to management by exception – passive showed a negative correlation with workplace safety. However, little empirical research has been done on the role and effect of management by exception – active on occupational safety.

Researchers have applied transformational leadership constructs in a safety context by codifying the concept of Safety-Specific Transformational Leadership (SSTL). Thus, in a safety context, transformational leadership has led to a better understanding of safety issues and improved communication (Conchie et al., 2012). According to Barling et al. (2002), safety-specific transformational leadership is a crucial driver of safety performance in a warehouse setting because it enhances employees' awareness of safety issues. Both these studies are particularly pertinent to this research which examines the role of leadership behaviors in explaining exceptional safety performance outcomes.

Lu et al. (2019, p. 2) defined safety-specific transformational leadership as "a leadership style that delivers a shared vision of safety to employees and encourages them to exercise their energy, skills, and self-efficacy to realize this vision." Essentially a manager utilizes inspirational motivation, idealized influence, and intellectual stimulation to enhance worker safety performance through safety participation and compliance (Barling et al., 2002; Innes et al., 2010). Conchie and Donald (2009) found safety-specific transformational leadership to be positively associated with employee safety compliance.

In prior literature, the impact of transformational leadership has been studied on safety compliance (Xia et al., 2021; Wu et al., 2022), safety participation, safety climate (Shi, 2021), safety motivation (Smith et al., 2020), safety citizenship behavior (Dartey-Baah et al., 2020), near

miss recognition (Lu et al., 2019), psychological empowerment (Avolio et al., 2004), task performance (Barling et al., 1996; Howell and Avolio, 1993), knowledge sharing (Yin et al., 2019), and goal commitment (DeArmond et al., 2018). Research has also found that transformational leadership is attributed to reduced work pressure and increased safety compliance in a healthcare setting (Ugwu et al., 2020). Clark (2013) found that transformational leadership is more impactful in promoting voluntary employee engagement to support safety versus conformity to safety requirements. Clark and Ward (2006) determined that transformational leadership influences employee safety perception and attitudes, which then affects the workers' actions to support safety. Employees who can relate to encouragement and motivation for safety involvement and participation from leadership tend to develop the impression that safety is prioritized and valued within the company (Clark, 2013). Transformational leaders focus on effective communication, empowerment, and setting examples when dealing with and establishing rapport with subordinates, resulting in employee motivation related to occupational safety (Barling et al., 2002). During intense pressure and stressful working conditions, transformational leaders may encourage associates to think creatively to address challenges, thereby improving safety compliance (Clark and Ward, 2006; Inness et al., 2010; Ugwu et al., 2020; Zohar, 2002).

Lu et al. (2019) derived the term safety-specific active transactional leadership, whereby leaders provide active supervision, contingent rewards, and penalties to improve employee safety performance. Lu et al. (2019) also found that safety-specific active transactional leadership positively influences near-miss recognition by stimulating goal orientation. Likewise, other studies have shown that safety-specific active transactional leaders motivate followers to obey safety regulatory requirements, minimize errors, and avert disciplinary actions (Kark et al., 2015; Wallace et al., 2008). Martinez-Corcoles and Stephanou (2017) researched military special forces

paratroopers and determined that active transactional leadership positively influences safety compliance and safety participation while curtailing risky behaviors. Dartey-Baah et al. (2020) determined that transactional leadership positively affects safety citizenship behavior in a power distribution setting. This result indicates that leaders who clarify expectations and rewards in exchange for employees accomplishing expectations can decrease workplace injuries. Leaders who monitor employees' behaviors to proactively intervene before the occurrence of serious problems can promote safety in addition to leaders who observe employees' behaviors to take corrective action reactively once problems have already occurred. Both can foster safety citizenship behaviors (Zohar, 2002; Clark, 2013).

Researchers have also identified transactional leadership as having a negative effect on employee behavior (Bian et al., 2019). The researchers reasoned that employee behaviors cannot be motivated by incentives alone, whereby this leadership style only rewards performance if the employee achieves a stipulated work goal. Consequently, the employee may focus more on the rewards than on improving individual safety behavior.

Limited empirical research has been done on the combined effects of transformational and transactional leadership in the workplace. Although previous research has emphasized the important influence that transformational and transactional leadership have on safety performance (Barling et al., 2002; Inness et al., 2010), most of what we know about the combined effects has been from a theoretical perspective. For example, Clarke (2013) proposed that safety leadership is most effective when it includes transformational leadership and the MBE-A component of transactional leadership. Barling and Riggio (2006) also derived a full-range leadership model. In addition to the four components of transformation leadership, the full range leadership model also encompasses the aspects of transactional leadership, including contingent reward, management-



by-exception (active and passive), and laissez-faire leadership. As the name infers, the full range of leadership model attempts to depict the entire range of leadership styles, from non-leadership to more transformational styles. One of the key insights of the full range leadership model is that managers are likely to use various leadership characteristics to be successful within organizations.

## 2.2 Leader-Member Exchange

Leader-member exchange as a subfield of leadership research originates from the vertical dyad linkage theory developed by Fred Dansereau, Jr., George Graen, and William Haga in 1975 (Bauer and Erdogan, 2016). Theoretical development of the vertical dyad linkage theory has gone through several iterations of refinement, ultimately leading to the leader-member exchange theory in subsequent years. Leader-member exchange (LMX) focuses on the dyadic social exchange processes between leader and follower, acknowledging that leaders develop different exchange relationships with their followers, thereby differentially impacting leader and member outcomes (Graen and Uhl-Bien, 1995). Leadership occurs when leaders and followers develop effective relationships based on trust, respect, and mutual obligations, resulting in mutual and incremental influence to meet shared interests (Uhl-Bien, 2006). Studies adopting this perspective (e.g., Hofmann and Morgeson, 1999; Yagil and Luria, 2010) have investigated relationship quality using the 7-point LMX scale (Graen and Uhl-Bien, 1995), relying on practices implicit within the scales that constitute trust, respect, and obligation. These are giving feedback, problem-solving, providing personal support, decision-making, and providing direction and clarity, which resemble some aspects of transactional and transformational leadership. Several studies have examined the channels through which the relationship between leaders and subordinates influences safety outcomes. They generally found that higher quality LMX, characterized by mutual trust, respect, and obligation, is significantly employed with higher safety outcomes (Kath et al., 2010), reduced

levels of safety-related accidents/near misses (Michael et al., 2006), and safety citizenship behaviors (Hofmann et al., 2003).

LMX is unique among the various recent leadership approaches due to its focus on leader-follower relationships and its link to employee performance. Other leadership styles tend to underscore the individual leader's influence on employee attitudes, behaviors, motivation, and accomplishments. Decades of LMX research have pointed out that high-quality LMX relationships are very beneficial to worker task performance (Dansereau et al., 1975; Dulebohn et al., 2012; Gerstner and Day, 1997; Liden and Graen, 1980). The focal point of LMX theory is that effective leadership processes occur when leaders and followers are able to establish mature partnerships, consequently tapping into the many benefits afforded by the relationship (Graen and Uhl-Bien, 1991). In such a way, LMX epitomizes realization of the relationship-based approach to leadership.

### **2.3 Employee Behaviors and Safety Performance**

Safety behaviors have emerged as a key component in mitigating workplace injuries and illnesses (Christian et al., 2009). Safety behaviors have been defined as actions that promote the safety and well-being of employees and their work environment (Burke et al., 2002). Beus, Dhanani, and McCord (2015, p. 482) define safety-related behavior as "workplace behaviors that affect the extent to which individuals or the workplace, in general, are free from physical threat or harm. This includes behaviors that mitigate physical threat or harm (i.e., safe behavior), whether rule prescribed or discretionary (Griffin & Neal, 2000), and also behaviors that subject individuals or the workplace to greater physical threat or harm (i.e., unsafe behavior), whether intentional or unintentional." Employee safety behavior may also be viewed as "a measure of an organization's safety performance" (Dartey-Baah & Addo, 2018, p. 189).

Neal and Griffin (2000) characterized safety behavior as consisting of two components: safety compliance and safety participation. They define safety compliance as adherence to workplace safety policies and procedures. Safety compliance establishes a baseline for safety outcomes and involves following policies, standards, and practices established to align with regulations. It consists of the core activities employees must carry out to preserve a safe workplace (Martinez-Corcoles and Stephanou, 2017). Compliance with safety policies and procedures encompasses intra-role safe work behaviors required and expected as part of the obligations and responsibilities of employees in assigned roles. Examples include following the correct sequence of steps when performing lock-out tag-out or having properly trained authorized support personnel when conducting confined space entry. Safety compliance behaviors, such as wearing personal protective equipment, are mandated actions necessary to keep the workplace and workers safe. Conformity with safety requirements means adherence to minimum safety policies and procedures at work (Innes et al., 2010). Personnel who comply with company safety standards are less likely to get hurt or injure others.

On the other hand, safety participation encompasses voluntary support for the broader safety environment within an organization. It involves extra-role, discretionary, and self-directed behaviors whereby employees go beyond prescribed safety precautions to establish a work environment free of unsafe conditions. Safety participation involves employees engaging in discretionary activities which support the safety of others. Griffin and Neal (2000) defined safety participation as voluntary participation in safety programs to develop a safe work environment. Safety participation involves individual, voluntary actions such as providing toolbox safety talks during recurring construction meetings or other safety activities. Other examples include

generating novel ideas to promote safety, participating in voluntary safety tasks, attending safety committee meetings, and safety best practice sharing among teams.

The safety performance model created by Griffin and Neal (2006) is one of the most widely studied to date (Martinez-Corcoles and Stephanou, 2017). The bi-dimensional safety performance model was based on the traditional job performance theory (Borman and Motowidlo, 1993; Motowidlo and Van Scotter, 1994), which distinguishes between task performance and contextual performance. Safety compliance was comparable to task performance which is defined as work activities that support an organization's primary business objectives and prescribed by formally documented job descriptions. On the other hand, safety participation was likened to contextual performance, evidenced by activities that contribute to an organization's social and core values and are voluntary (Borman and Motowidlo, 1993).

Safety performance is the extent to which companies can ensure a healthful workplace free of injuries and illnesses. De Koster et al. (2011, p. 754) defined safety performance as "the extent to which companies are able to prevent accidents and errors." Dunlap (2011) conveyed a more traditional definition of safety performance: a measurement of the number of injuries an organization experiences over time. The Occupational Safety and Health Administration (OSHA) defines safety performance as key performance indicators that help companies track, monitor, and trend progress toward maintaining an injury and illness-free workplace. Ongoing safety performance monitoring informs management and front-line workers that safety programs operate as intended and effectively control identified hazards. Safety performance measures also help businesses determine progress toward established safety goals and objectives. There is extensive literature available that denotes the importance of organizational leadership engagement on strong safety performance in the workplace (Bass, 1985; Bass and Riggio, 2006; de Koster et al., 2011;

Krause, 2004; Mullen et al., 2017).

### 3 METHODS

Yin (2018, p. 2) proposed using a case study method "when (1) the main research questions are 'how' and 'why' questions, (2) researchers have little or no control over behavioral events, and (3) the research focus is a contemporary phenomenon." Therefore, a case study method was employed for this research because (1) the research questions are how and why types, (2) I do not directly control any employee behaviors, and (3) safety is an important issue facing companies worldwide. I adopt a multiple case study design with the units of analysis being manufacturing facilities. Myers (2020, p. 45) shared that "interpretive researchers tend to focus on meaning in context. They aim to understand the context of a phenomenon since the context is what defines the meaning of a word and the meaning of a particular event or situation." I conducted the research with a study of two cases by employing interviews, field observations, extensive notes, and company documents, which yielded insights related to leadership styles, safety behaviors, and safety outcomes.

#### 3.1 Case Selection

There are similarities and differences between the two sites selected for this multi-case study research. Site A is a large industrial manufacturing facility with a combination of fully automated production equipment, manual assembly lines, chemical laboratories, and offices with operations centralized in one general location. The location consists of multiple manufacturing buildings and warehouse spaces. Demographics for Site A indicate a young workforce, with 76% being thirty years of age or younger. The population for Site A is predominantly comprised of personnel having a high school education, and 70% of the employees are females.

In comparison, demographics for Site B indicate middle-aged to senior staff, with 81% being between thirty-five and sixty-four years of age. The population for Site B is predominantly comprised of personnel having advanced degrees, and 61% of the employees are males. Site B is

a smaller industrial manufacturing operation consisting of machinery manual assembly lines, prototype testing laboratories, hardware/software laboratories, and office spaces. Site B has a primary manufacturing facility with two satellite production buildings in different cities.

The two sites are located in different countries, one in Indonesia, which has an emerging market economy, and the other in Germany, which has an advanced high-income economy. The occupational health and safety regulations are very different when comparing Indonesia to Germany. Occupational Safety and Health (OSH) in Indonesia is still developing, with major focuses on encouraging public and private agencies to establish OSH programs and implementation of accurate and reliable data reporting for general industry (ILO.org, 2018). On the contrary, the regulations in Germany are well-established and enforced (Federal Ministry of Justice, 2022). For example, German local OSH regulations stipulate the requirement for hazard assessments in every workplace to check for potential defects, and corresponding safety measures must be implemented based on assessment findings. The Arbeitsschutzgesetz (German Occupational Health and Safety Act) also requires employers to provide training to staff related to occupational safety at regular intervals.

Site A was selected for this research because it was the only large manufacturing facility within the company with over 1,000 full-time employees with no recordable workplace injuries for four consecutive years from 2018 through 2021. Site B was selected for this research because it was the only mid-size manufacturing facility within the company with around 250 full-time employees with no recordable workplace injuries for three consecutive years from 2020 through 2022. This stands in notable contrast with other sites with multiple worker injuries during the same timeframe.

The Site A study was conducted as part of a group research project in the DBA program. Data collection for Site A was done between March through June 2021. Data was collected from four sources: informal discussions, workplace observations, company documentation (reports, standards, procedures, minutes, regulatory documentation, business plans, and metrics), and interviews with management and non-management employees. Semi-structured interviews were conducted with pre-formulating questions for participants yet allowing flexibility for new questions to emerge during the conversations based upon insights gained from interviewees. Each interview was conducted virtually using the videoconferencing system and lasted between 60 and 90 minutes. Although all upper-level managers spoke fluent English, some employees at the plant did not. Therefore, a global professional translation and interpreter services company was hired to provide translation services. Two local interpreters in Indonesia supported the virtual interviews and field observations to assist employees who were not fluent in English. All interviews were audio and video recorded and then transcribed. The transcribed text served as the foundation for data analysis.

Data collection for Site B was conducted between August and November 2022. The research data was collected from the same primary sources as for Site A. Semi-structured interviews were conducted by utilizing an interview guide while allowing flexibility for new questions to emerge during the conversations based upon insights gained from interviewees. Each interview lasted for approximately 60 minutes. Up to two additional follow-up interviews were permitted based on the research plan, lasting no more than 30 minutes each. Only three of the initial interviews required follow-up. For the site in Germany, a global professional translation and interpreter services company was hired to provide translation services. Two certified interpreters from the company supported the virtual interviews and field observations to assist



employees who spoke German and were not fluent in English. All interviews were video recorded using a web conference platform, audio-recorded with a digital tape recorder (for backup), and then transcribed.

### 3.2 Informants

Twenty-one informants were interviewed for the Site A case study. Informants were identified from three categories within the organization: senior leadership, middle management, and non-management. Five members of top management, seven supervisors, and nine non-management employees selected randomly were interviewed. Informants represented diverse roles, levels of experience, and departments within the organization. The job titles for informants included plant managers, supervisors, shift heads, process heads, operators, line leaders, technicians, and material handlers. Departments for informants included Production, Quality, Health Safety & Environment, Site Facilities, Shipping & Receiving, Manufacturing, Science & Technology (MS&T), and Engineering. A summary of the informant information is given in Table 3.

**Table 3 Description of Informants for Site A**

Participant	Department	Gender	Translation Required	
			(Yes/No)	Number of Interviews
Senior Manager 1	Manufacturing	Male	No	1
Senior Manager 2	HSE	Male	No	1
Senior Manager 3	General Manager	Male	No	1
Senior Manager 4	Quality	Male	No	1
Senior Manager 5	Manufacturing, Science & Technology	Female	No	1
Middle Management 1	Production	Female	Yes	1
Middle Management 2	Production	Male	No	1
Middle Management 3	Water Systems	Male	No	1
Middle Management 4	Production	Male	No	1
Middle Management 5	Laboratory	Female	No	1
Middle Management 6	Production	Female	Yes	1
Middle Management 7	Production	Male	Yes	1
Non-Management 1	Engineering	Male	Yes	1
Non-Management 2	Engineering	Male	Yes	1
Non-Management 3	Production	Female	Yes	1
Non-Management 4	Production	Female	Yes	1
Non-Management 5	Production	Female	Yes	1
Non-Management 6	Warehouse	Male	Yes	1
Non-Management 7	Quality	Female	No	1
Non-Management 8	Production	Female	Yes	1
Non-Management 9	Production	Male	Yes	1
Total =				21

Twenty-three informants were interviewed for Site B's case study. Informants were identified from the same three categories within the organization as identified for Site A. Seven members of top management, nine supervisors, and seven non-management employees were interviewed. Middle management and non-management were selected using a random selection process. Selected informants represent diverse roles, levels of experience, and departments within the organization. Examples of roles for informants at Site B included department managers, superintendents, shift heads, process heads, operators, line leaders, maintenance technicians, material handlers, or the equivalent. These informants were from departments such as Production, Health Safety & Environment, Site Facilities, Quality, Manufacturing, Science & Technology (MS&T), Supply Chain, Research & Development, and Engineering. A summary of the informant's information is given in Table 4.

**Table 4 Description of Informants for Site B**

Participant	Department	Gender	Translation Required (Yes/No)	Number of Interviews
Senior Manager 1	HSE & Site Facilities	Male	Yes	1
Senior Manager 2	Quality	Male	Yes	1
Senior Manager 3	Research & Development	Male	Yes	1
Senior Manager 4	Research & Development	Male	Yes	1
Senior Manager 5	Production	Male	Yes	1
Senior Manager 6	Manufacturing, Science & Technology	Male	Yes	1
Senior Manager 7	General Manager	Male	Yes	1
Middle Management 1	HSE	Male	No	1
Middle Management 2	Technical Services	Male	Yes	1
Middle Management 3	Procurement	Male	Yes	1
Middle Management 4	Production	Male	Yes	1
Middle Management 5	Supply Chain and Operation	Male	Yes	1
Middle Management 6	Research & Development Engineering	Male	Yes	1
Middle Management 7	Supply Chain and Operation	Female	Yes	1
Middle Management 8	Technology & Systems	Male	Yes	1
Middle Management 9	Manufacturing, Science & Technology	Female	Yes	1
Non-Management 1	Research & Development Engineering	Female	Yes	1
Non-Management 2	Research & Development Engineering	Female	Yes	1
Non-Management 3	Research & Development Engineering	Male	Yes	1
Non-Management 4	Regulatory Affairs	Female	Yes	1
Non-Management 5	Quality	Female	Yes	1
Non-Management 6	Research & Development Engineering	Female	Yes	1
Non-Management 7	Quality	Male	Yes	1
Total =				23

### 3.3 Interviews

Semi-structured interviews were conducted with all informants by pre-established questions to ensure consistency across all interviews while allowing the opportunity for new questions to emerge (Myers, 2020). Initial interviews were held with the plant's senior leadership, and these sessions were used to modify the interview questions used in subsequent interviews where interpreters were present. Informed consent documents (in English and Indonesian for Site A; in English and German for Site B) were administered and received from all participants in the study. The informed consent record served to notify interviewees about the aspects of the case study, explain that participation in the research study was entirely voluntary, and formally solicit their acknowledgment to participate in the research study. Time zone differences were considered for the interview sessions to ensure that interviews occurred during regular business hours for all informants. The Health, Safety, and Environmental (HSE) Managers at Site A and Site B served as coordinators for aligning and scheduling all interviews. Once the HSE Managers confirmed the employee's acceptance for an interview and receipt of the signed informed consent document, teleconference invitations were extended via e-mail, with interpreters invited whenever necessary for non-English speaking informants. The interview schedule was established and aligned with each site regarding dates, times, interview candidates, and requirements for interpretation services.

The teleconference interviews were video recorded utilizing the company web conference platform with a digital recorder used as a means for backup. The digital recording ensured optimal audio quality to develop transcripts for coding. The interview meeting invitations were sent to recipients at least one week in advance to allow sufficient response time. Established questions were asked based on the interview guide, while notes were taken during the interviews, mainly focusing on follow-up questions and requests for clarification. The semi-structured interview approach aided in improvisation and asking new questions that surfaced during the conversations.

After each interview, all videoconference and audio files were uploaded to a secure file-sharing account.

Broad and open-ended questions were developed to allow participants to engage in discussions about safety, leadership, and work practices. Careful consideration was given to the questions developed in the interview guide to elicit participant reflections, specific experiences, interactions, and individual perspectives. Employees were asked to share (1) how they believed the plant achieved zero recordable injuries during the last three years; (2) what they believed to be the most important elements of the plant's safety program as they reflected over the previous three years; and (3) what they believed were the key success factors. Follow-up questions were also asked about the safety process or procedure, managers' or supervisors' behaviors and influence, how various departments interact to manage and resolve safety-related issues, aspects of the safety program or process that could be changed or improved, how managers and employees established trust related to safety, and other issues.

### **3.4 Field Observations**

A site visit to the Indonesian plant occurred during the second half of July 2021 to conduct field observations. Myers (2020, p. 181) advocated that "the main advantage of fieldwork is that it enables an in-depth understanding of the attitudes, beliefs, values, norms, and practices of the social group or organization being studied." The focus was on employee actions and interactions, physical environments in the workplace, operational activities, and business events. Informal discussions were held with employees under normal operating conditions while creating field notes. All the interactions were recorded using a video camera during the visit, which was approved by company management before the trip.

Steps were taken to ensure the fieldwork phase proceeded with minimal operational impact while building a sense of partnership with the plant. Before traveling, information was studied

about the manufacturing site and Indonesian culture to learn as much as possible prior to travel. A tour of a similar manufacturing facility in the United States was conducted before the trip to Indonesia to better understand the overall production processes. Preparatory conversations about key points to know and consider were held in advance with the Health, Safety, and Environment (HSE) Manager, the primary point of contact at the plant. I was mindful of building rapport and trust relationships with the organization's employees before and during the site visit.

A planning meeting was held with the HSE manager for the site to review the plant layout and organizational structure for the site in Indonesia. It was agreed that the researcher would observe operations in all production, site facilities, and administrative areas during the visit. A detailed onsite itinerary was developed to identify specific windows of time and locations to observe employees in action for each process and to establish responsibilities for personnel who would provide an overview of daily work tasks for each area. Locations identified for field observation included all production processes, laboratories, facilities, shipping and receiving, new construction, health and wellness, and administrative offices. I became immersed in the plant's ongoing activities during the site visit over the three days. I was taken to various operational areas to understand better everyday work routines and practices, standard operating procedures, employees' interactions, and their safety behaviors. Employees were observed on the production floor in their natural setting. I interacted with them by having conversations and receiving explanations on how specific tasks were to be performed. When additional clarification was needed, or the information conveyed was unclear, more details and clarification were requested, and follow-up questions were asked. One of the primary objectives for conducting fieldwork was to gain an additional dimension of the inner workings of this facility. Interactions also helped me

to better understand ideas, beliefs, and perspectives at multiple organizational levels. Taking an upfront view of the business provided visibility on the safety culture.

A site visit to Germany was held from September 12<sup>th</sup> – 16<sup>th</sup>, 2022. Day-to-day activities at three locations for Site B were observed over five consecutive business days. A professional interpreter was onsite and participated in the walkthroughs to offer support during conversations with non-English speaking informants. The site tour discussions on the production floor and in the office areas were only audio recorded at the request of top management due to the proprietary nature of equipment and processes. Employee behaviors, workspace conditions, safety signs and systems, personal protective equipment, health and wellness offerings, ergonomics, operational activities, and business events were the primary focal points for the field observations. Informal discussions were held with associates under normal operating conditions while creating field notes. Site visits and tours were completed for all three locations for Site B, which were in different cities in Germany.

### **3.5 Archival Data**

Documentation and archival records provided by the HSE Managers in the plants in Indonesia and Germany served as additional data sources for each case study. Files requested for review and provided by Site A and Site B included:

- Organization charts
- HSE Programs Information
- Quarterly Business Updates
- Newsletters
- Photographs
- Videos

- Injury and Illness Logs from 2016 to the present
- Procedures and Forms
- General Operations Information
- Production Demands
- Operations and Quality Performance Data
- HSE Management System Metrics Data

The request for data was submitted to the primary points of contact. Access to an internal folder on a cloud storage application, Microsoft Teams, was established to upload requested files. The files were then transferred to the dissertation file-sharing folder for review and analysis. The academic advisor for the research was provided access to the shared folder to retrieve and review research documents. Access to the shared repository also allowed the academic advisor to share exemplary journal articles and other helpful resources throughout the research.

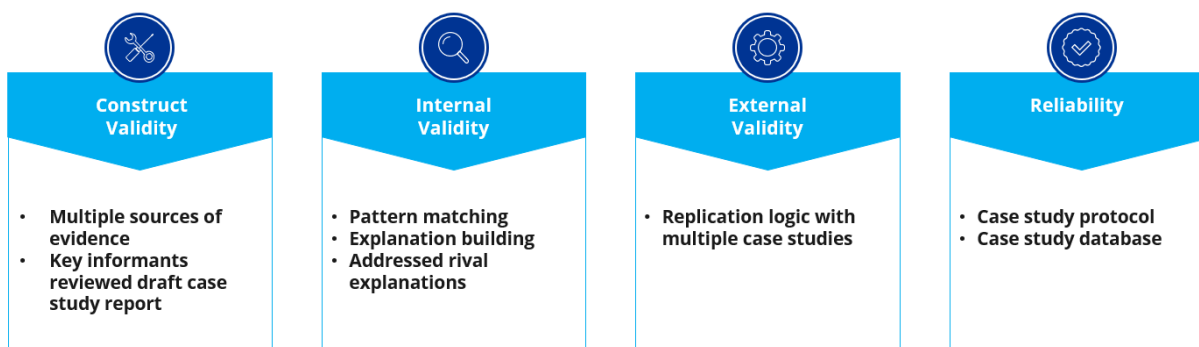
### **3.6 Near Miss and Good Catch Reporting**

Metrics for both companies were collected for the periods 2018 through 2022 for analysis and included the leading safety indicator data for near miss and good catch reporting. The OSHA and National Safety Council Alliance Near Miss Reporting Systems fact sheet (2013) define a near miss as “an unplanned event that did not result in injury, illness, or damage – but had the potential to do so.” A good catch (Douros, 2019) refers to recognizing and reporting unsafe conditions and actions followed by a resolution to prevent an unfortunate event from occurring. The metrics review for the case study provides a rich environment to understand the potential role safety leadership and leading safety indicators may play in explaining the safety performance outcomes.

### **3.7 Triangulating Data**

Data was collected from multiple sources (direct observations, interviews, and archival

records) to routinely check the consistency of the findings and establish converging lines of evidence to develop robust results. Identification of convergences was sought whereby three or more independent resources led to the same fact, finding, or interpretation. The more different types of data sources point to a particular conclusion, the better the corroboration. Developing convergent evidence through data triangulation and having key informants review the case study reports helped strengthen the construct validity for both case studies (Yin 2018). Other methods identified in Figure 2 were also utilized to enhance case study research rigorously. Using research design and replication logic for the multi-case study strengthens the external validity. The generation of a case study protocol as part of the Institution Review Board submission process and the utilization of a shared archival database for both case studies reinforce the overall reliability of the research.



**Figure 2 Steps utilized to ensure research rigor.**

### **3.8 Analysis and Coding**

Data analysis was performed utilizing interviews, archival data, and field observations. Coding and data analysis were performed after all of the data had been collected to reduce the potential confirmation bias that could influence the results (Page et al., 2014). The analysis involved an iterative process of moving back and forth between the data, emerging themes, and extant literature. The three phases of data analysis and coding process recommended by Auerbach



and Silverstein (2003) were followed: making the data manageable, hearing what was said, and developing theory. The transcripts from the 21 interviews for Site A were first examined to look for indications of typical repetitive occurrences, which became the relevant text for the research questions. The relevant text was then used as the basis for developing and consolidating repeating ideas. As commonalities among the repeating ideas were analyzed, coherent groups of repeating ideas were created and rolled up to themes that formed the foundation for theory development. The same process was followed for analyzing the 23 interview transcripts for Site B.

Transcripts were developed for each of the interviews and the field observations. An initial coding scheme (see APPENDIX 1) was devised to determine definitions for concepts that would serve as a guide for identifying the relevant text in each transcript. The transcripts for Site A and Site B case studies were reviewed to filter and select the relevant text used in the analysis. The problem, area of concern, conceptual framing, research question, and aligned concept definitions written using Mathiassen's research design template (2017) served as a foundation to read through the transcripts and highlight the pertinent phrases and statements. The relevant text was then placed in an Excel spreadsheet for easy consolidation, filtering, categorization, and discussion. The next step encompassed searching the relevant text for repeating ideas. Once identified, the repeating ideas were grouped into general themes. In the final analysis phase, working at a more abstract level, the themes were combined into general concepts referred to as theoretical constructs. The resulting theoretical constructs were then used to create a theoretical framework and narrative by restating and summarizing the interview candidates' stories in terms of the theoretical constructs (Auerbach and Silverstein, 2003).

Empirically based pattern matching resulted in themes and constructs to understand activities and processes for Site A and Site B, which serve as the basis for within-case analysis for

each location. Within case study highlights the unique distinctions for each of the sites. As part of the within-case analysis, triangulation using multiple data sources was also used to substantiate interpretations, corroborate key concepts identified, and ensure nothing was overlooked in the analysis process. A cross-case analysis is then used to compare and contrast results for Site A and Site B. The cross-case analysis describes the commonalities and differences between the two cases.

## 4 FINDINGS

### 4.1 Near Miss and Good Catch Reporting

Site A and Site B implemented a commercial off-the-shelf modular Health, Safety, and Environment software package developed and customized for use in the workplace. Sites worldwide use the customized application to report metric data, including injuries, illnesses, near misses, and good catches. The application provided dashboards to allow management to monitor and trend elements of HSE business processes. Tables 5 and 6 report near misses and good catches at the Indonesian and German sites, respectively, from 2018-2022. Table 5 shows that at the Indonesian site, both the number of near misses and the number of good catches start high and then trend down over time, which may suggest that the ongoing efforts to address near misses and the corrective actions implemented to prevent future occurrences were effective. Note also that except for the year 2018, the number of good catches was much higher than that of near misses in all other years, suggesting that the reduction in near misses is possibly due to the proactive actions of good catches reported. On the other hand, Table 6 for the German site shows that there were zero near misses reported over the five-year period, while there is an overall downward trend for the good catches. Management at the site in Germany clarified there were no near misses due to diligence in quickly and proactively addressing unsafe conditions over several years, which eventually resulted in consecutive years with no near misses. Note that the number of good catches each year at the German site was much smaller than that of the Indonesian site. This is likely because the Indonesian site is much bigger than the German site.

**Table 5 Near Miss and Good Catch Reporting for Site A in Indonesia.**

Metric	Year				
	2018	2019	2020	2021	2022
<i># Near Misses Reported</i>	727	383	148	120	106
<i># Good Catches Reported</i>	692	807	597	458	465

**Table 6 Near Miss and Good Catch Reporting for Site B in Germany.**

Metric	Year				
	2018	2019	2020	2021	2022
<i># Near Misses Reported</i>	0	0	0	0	0
<i># Good Catches Reported</i>	104	139	108	46	48

## 4.2 Site A

Site A was established in 1994, with commercial operations beginning in 1995. In 2020, Site A had 1,052 full-time employees with demand and output of over 41 million units of product. The ages for employees ranged from 18 to above 50 years, with 55% of the workforce being eighteen to twenty-five and 21% being twenty-six to thirty years of age. 70% of the total work population was female, and 30% was male. Over 98% of the employees were Indonesian nationality, with less than 2% being from other countries. The education level for the majority of the employees is senior high school. See Table 7 for the distribution of employees by their education levels.

**Table 7 Demographics for employee education at Site A.**

<b>Education</b>	<b>Number of Employees</b>	<b>Percentage</b>
Senior High School	825	78.42%
Diploma Degree	68	6.46%
Bachelor's Degree	142	13.50%
Master's Degree	16	1.52%
Doctorate Degree	1	0.10%
<b>Total</b>	<b>1052</b>	<b>100%</b>

Site A comprised multiple departments responsible for different aspects of the business and included Production, Quality, Engineering, Site Facilities, Manufacturing Science & Technology, and Warehouse operations. Most employees worked in manufacturing and Quality laboratories. The operations in the plant ranged from fully automated production lines to completely manual assembly and packaging stations. Safety hazards likely occur in the following situations in production, laboratory, and warehousing areas:

- Hazardous chemicals
- Hazardous energy
- Strains and sprains
- Contusions
- Pinch points
- Exposure to moving parts
- Noise
- Lifting, pushing, pulling

- Electrical
- Slips, trips, falls
- Cuts and lacerations
- Powered industrial truck operations
- Confined spaces

#### **4.2.1 Unified Safety Vision**

Top management at Site A worked diligently over multiple years to convey an unwavering and actionable message and image of safety success. This was accomplished by reiterating desired safety behavioral descriptives to inspire and motivate employees to action. The same consistent message was cascaded through all levels of the organization, creating unity related to desired safety outcomes. The goal of zero injuries was emphasized through several measures, such as

- leaders regularly speaking with people at all levels about safety,
- identification of near misses and good catches to prevent incidents, and
- authority and expectation to speak up whenever something was determined to be unsafe.

By taking these steps, leadership communicated an inspirational vision to employees to minimize and eliminate accidents. Figure 3 shows how the vision created by leadership is shared across different levels of the organization. The General Manager and his direct reports demonstrated an enduring, genuine, ongoing, and personal commitment to safety in the workplace. Likewise, employees embraced the messages as they understood how the desired outcome was essential to their personal well-being and the organization's success, as evidenced by the following testimonials:

*"I think a couple of things have happened over the last few years that I've seen. One is obviously just great communication on safety. Safety's number one, safety is our number one priority. And we keep telling people every day safety is our number one priority....The message for us is safety's number one, safety first, quality*

*always, genuinely as a message.” – Senior Manager 4*

*“So, the priority for the company based on my occupation for one year and five months is that safety is the priority, the safety of the employees is the priority, of course.” – Non-Management 4*

*“Almost every day we are reminded to take care of our safety and our health.” – Non-Management 3*



**Figure 3 Safety Vision disseminated throughout the organization.**

#### ***4.2.2 Partnerships Fostered by Trust and Collaboration***

Site A has established various methods to incentivize hazard recognition and reporting, and the leadership engages with employees to find and address potential exposures throughout the workplace. There are expectations and encouragement from management for workers to report unsafe conditions, and subordinates see it as a personal responsibility to inform management when potential hazards are identified. However, it became important for site leadership to demonstrate the value of safety through follow-up and offering feedback on resolving safety concerns to promote continued employee engagement. Each of these circumstances served as an opportunity

for leaders and followers to evaluate and develop mutual trust. The leader's trust was built on workers' ability to mitigate potential risks to the business and their integrity in achieving established goals and objectives. In return, management continued to delegate the task of hazard identification and reporting to frontline workers, which indicated to the employee the level of trust management had in them. This is evidenced by the following statements made by management and non-management employees.

*“When there is an action to be completed from a safety walk, it is assigned to a person to complete and document in [the HSE management system application] for follow-up by the HSE team.” – Middle Management 3*

*“Follow-up on the feedback is important so that people feel they are being heard and that the feedback is meaningful.” – Senior Manager 5*

*“If the safety concern is reported in the morning, follow-up could occur immediately. If it is in the evening shift, it may have to wait until the morning. Items are typically addressed within three days. However, urgent matters will be addressed right away.” – Non-Management 8*

Timely resolution of identified safety problems within the workplace was an organizational effort and not the sole responsibility of a specific department or individual. When a safety issue surfaced, management partnered with the employees on resolution. Sometimes the correction was immediate and completed on the spot, while other times, it may require significant collaboration through information gathering, feedback or explanations, root cause analysis, engineering design, and problem-solving until a path forward was identified. Taking a more inclusive and collective approach resulted in better safety solutions and higher team cognition.

The functional areas viewed the Health, Safety, and Environment (HSE) as leaders with knowledge and expertise in the area of safety. So anytime there was a change in process, development of a new production system, set-up of a new assembly workstation, or a technology transfer, a member of the HSE team would be invited to collaborate and partner with the



department to perform Hazard Identification and Risk Assessment (HIRA). Obtaining HSE's feedback and alignment early in the project lifecycle is beneficial because it helps control unforeseen risks to employees and the business. Other benefits of the proactive approach included improved project planning and budgeting, incident elimination, and improved worker awareness about the potential dangers of the equipment or system. One manager commented on the involvement of HSE:

*“So, they said about leadership, right, we want to invite. And also, I think it's getting safety, you know, HSE to be involved from the beginning of any changes and any projects, right. It is important.” – Senior Manager 3*

HSE committees were also used to promote and share safety information throughout the organization, thereby proliferating safety knowledge. The General Manager led the sitewide cross-functional HSE committee meetings with support from the HSE department. The presence and facilitation of these recurring meetings by the General Manager was a way to demonstrate the value of safety. It symbolized to frontline workers that top management cared about the protection and well-being of personnel. It also made evident that the General Manager saw safety within the company as his personal responsibility. Representatives from various departments participated in the monthly sitewide HSE committee meetings; therefore, the drive to promote the safety of employees cascaded to the different departments throughout the organization. By providing a forum for workers to voice, collaborate, and resolve safety concerns, workers viewed themselves as partners in creating a safe work environment, as evidenced by the following comments:

*“Other topics covered during the HSE Committee Meetings include information from Global HSE, HSE government, and regulatory updates, new HSE culture items, and department safety implementations for shared learnings. Another objective of the HSE Committee Meeting is to share safety corrective actions, Good Catches, and Near Misses between departments in case there are any similar events or to prevent it from happening in other areas.” - Middle Management 2*

*“Various departments are represented at the monthly HSE Committee meetings*

*where safety topics are shared.” – Senior Manager 5*

The site management has implemented multiple proactive safety measures as part of day-to-day activities to address problems promptly. Structured routine processes are used to reduce incidents and promote safety. Steps are taken in advance to anticipate and prevent injuries from occurring. Typical tasks include daily briefings, walkthroughs, inspections, conversations, visual aids, shift huddles, and active supervision. These routine, consistent actions have significantly improved safety at the plant. Safety inspections and walkthroughs are means for management to engage in conversations with the employees and help prevent injuries. Through a critical examination of an area, inspectors help to identify and address operator concerns, unsafe behaviors, and hazardous conditions. Inspections and walkthroughs also allow for further understanding of job tasks, identifying potential hazards, and recommending corrective solutions. Safety walks are then reviewed to monitor the effectiveness of corrective actions implemented. Supervisors utilize daily briefings and shift huddles to share information about potential or current problems on the production floor. Briefings are also used to inform others about exemplary safety behaviors. In addition, moments of brief training help to increase general safety awareness among frontline workers. One informant shares a recollection regarding a question raised and the proactive safety measures:

*“Site Leadership weekly to monthly safety walk with General Manager and Quality Head for inspection and safety conversations. They will ask, “Do you have any concerns with safety?” - Senior Manager 5*

The benefit of proactive safety oversight is that it reinforces a positive culture that prevents incidents from occurring while improving workers' overall health and safety. One of the most significant advantages of anticipatory safety behaviors is reducing workplace injuries. Management and non-management at the site demonstrate an understanding of the long-term

benefits of an effective occupational health and safety program by proactively doing everything possible to ensure safe production. These actions taken by managers and supervisors exemplify safety leadership which sends a positive message to every employee about the commitment to safety.

Another routine developed was the daily staff briefing on the production floor which included relevant safety reminders, lessons learned, awareness topics, and other information pertinent to the operators. Sometimes the information shared was derived at the site level. In contrast, at different times, the information source might have been an occupational health and safety regulatory update or learnings disseminated by Global HSE to the sites. In essence, this succinct morning or start of shift meeting was designed to keep everyone informed about safety occurrences. It also provided an opportunity to update employees on progress towards implementing corrective actions to address safety concerns, thereby keeping the workforce well acquainted with what was happening in the plant. A few associates recalled their experiences with daily debriefs as follows:

*“We, as superintendent and supervisors, have daily meetings where all the safety issues are also discussed there. If in a meeting, we have something very urgent that needs to be informed and needs to be delivered, informed to the operator immediately, so basically, the meeting can be conducted. I can gather my team anytime. It depends on the urgency of the case or the information. And, if it’s not that urgent, I can do it on the other meetings, or usually, in the week, I usually gather, I talk, and I have a meeting with my teams twice a week, but this is where I usually inform about the safety issues or any other information that needs to be conveyed.” - Middle Management 1*

*“Team lead or line leader does a daily safety briefing with operators on the production floor.” – Senior Manager 5*

*“And then we receive all the information related to the HSE issue on the production floor. It’s a collaboration between all the teams like our HSE department always deliver the HSE information to the supervisor level and then process head on the floor, and then they deliver this information to the operator or subordinate.” - Non-Management 7*

An additional standardized practice offered in the manufacturing areas comprised of fully manual tasks was periodic shift stretching programs. Responsibilities for operators in these areas involved manual manipulation tasks with repetitive motions and fine motor skills done for extended periods of time. To avoid strains and sprains, fatigue, and burnout challenges, structured periodic conditioning exercises were integrated as part of the workday. Operators entrusted and partnered with supervisors to guide them hourly for a few minutes to complete established stretches. Consequently, the workers experienced the benefits of decreased fatigue and increased recovery of the musculoskeletal system. Leaders and followers were taking a proactive approach to injury prevention while improving well-being in the workplace. An operator shared experiences with pre-conditioning stretches on the production floor:

*“every one hour, there's an alarm notifying us to do some stretching. So just to make sure that we are not...we have the time to stretch.” – Non-Management 5*

Routines were set up in areas denoted as highly hazardous due to the presence of hazardous chemicals. Engineering controls and electrical classifications were also implemented as special precautions to protect employee safety, as described by a manager:

*“Daily checking was implemented in the Tank Farm area to ensure the correct PPE is used in the area and electronic devices are not used in the high hazard areas.” – Middle Management 2*

Top management made significant strides to decentralize workplace safety at Site A by deploying responsibilities to middle management and the lowest levels of the organization. Decentralization offered the added advantage of faster communication and responsiveness to safety issues. Safety training content was shared with employees at all levels of the business to educate and equip operators with the knowledge needed to address concerns. Issues that operators could not address directly were escalated to middle management for collaboration and problem-

solving. Employees felt free to speak up during solution-generation sessions, and feedback was offered on options to prevent injuries. Middle management then disseminated information related to the resolution of near misses or unsafe conditions by briefing their teams so that they would take precautionary steps in their respective workspaces to prevent injuries. The site achieved and sustained exceptional safety performance by consistently focusing on minor aspects, such as unsafe conditions. In numerous facets of daily operations for Site A, workers willingly volunteered to support safety based upon partnerships between leaders and followers, as depicted by the comments from senior management and a frontline worker.

*“There's been a great effort to decentralize safety responsibility.” – Senior Manager 4*

*“One of the things is they deliver the HSE materials to educate the operator. Then they provide any feedback for any issue that would escalate and then try to find a problem solving for the things related to the HSE issue.” – Non-Management 7*

*“Feedback is offered by people on the production floor for safer alternatives to prevent associates from accidentally getting injured.” – Senior Manager 5*

Thus, when it comes to the feedback and resolution of safety issues across the organization, employees are viewed not only as trusted assistants in the identification and monitoring of safety-related problems but also as critical stakeholders and partners in the resolution process, as evidenced by the following comment from an employee:

*“I think other than the importance of safety policy, the company also considers the importance of the employee and considers the employee as a partner, and also they jointly and together are responsible for safety.” - Non-Management 9*

### **4.2.3 Motivational Role Modeling**

Management sets the tone for acceptable safety behaviors within the plant by leading by example. Leadership acts as role models by demonstrating appropriate safety behaviors for workers to emulate. By “walking the talk,” it becomes lucid to employees what their superiors

expect of them. Demonstrating satisfactory safety behaviors in words and actions uplifts management's credibility with their teams. Employees can view and experience daily that their direct managers are committed to the cause of safety. One manager voiced thoughts about leading by example:

*“We give an example to them of how we follow HSE requirements. When we give great examples, then they will follow us.” – Middle Management 3*

Site leadership recognized the prospects for improving business processes and safety systems. Middle management leveraged learning opportunities whenever other sites within the company shared applicable information regarding circumstances that led to potentially serious injuries or fatalities. These potential serious injury reports served as warnings for operations to use the information to proactively review current processes for comparable gaps. The communications were shared with operators to mitigate similar risks before the occurrence of an incident. Similarly, Hazard Identification and Risk Assessments performed on new equipment, and system installations provided windows of opportunity to review processes to evaluate how things might be done better. On other occasions, feedback was sought from employees performing manual tasks at workstations for extended periods to obtain input related to ergonomic improvements. Management often motivates and inspires employees by proactively collaborating on how work could be done better and safer. Supervisors guided their direct reports by helping them discover more desirable alternatives by clarifying the value for each employee, as evidenced by this manager's comment.

*“We need to encourage the people by giving them a better example of the situations from other sites to receive, be open-minded, and become more vigilant in their area.... Of course, we need to motivate them and what is actually the benefit for their safety. It is not for me and not for the company, but for the employee.” – Middle Management 2*

Plant leadership is committed to safety and puts employee safety and well-being first. Managers exhibit safety commitment by being reliable in safety support, offering resources for a comprehensive safety program, caring for employees, considering the individual needs of personnel, and encouraging workers to develop creative solutions for addressing safety problems. There is a high degree of focus on employee concerns about safety matters and significant evidence that the remediation of safety issues is a high priority, as shown by the following employee comments:

*"Yeah. It's very, very, different...far from the place that I've worked before. So, here is the safety is really, really, good (and is) the one most important thing and the primary thing." - Non-Management 5*

*"(It is) Important to respond when safety concerns are voiced even if it is conveyed that it is something we will not be able to implement on this scale or if there is another way to implement." -Senior Manager 5*

In addition, leadership has recognized the employees' unique needs, providing necessary tools and accommodations for employees to create a devoted workforce. As a result, the employees feel cared for as company benefits are provided to promote the overall safety and well-being of employees and minimize work distractions. In addition, these benefits boost employee morale as they feel safe and are willing to adapt to reach their full safety potential, as reflected in the following representative comments from employees.

*"The company provides a canteen for us to have our meals. They provide First Aid tools. They give us a place to pray for us who are Muslims. They give us a place when we have a break and also provide us with a clinic." – Non-Management 6*

*"The company provides meals, bus transportation, and dormitory assistance." – Non-Management 6*

Because of the shared safety goals, I find that employees are more likely to engage in activities that benefit the organization. In fact, I observe a ubiquitous communal approach to safety which is evident in the social exchanges between management and employees characterized by

more of a feeling of mutual responsibility for the welfare of each other rather than just rule enforcement. This concern for mutual support and implementation in the context of the site's safety program is evident across the organization, with strong alignment toward achieving organizational goals. Therefore, this communal approach to safety-related issues is fundamental to the safety culture and outcomes, a hallmark feature that helps explain the site's exceptional safety achievement. If leaders demonstrate safety commitment, then employees will follow and make safety commitment a part of the culture.

#### ***4.2.4 Knowledge Management***

One of the unforeseen aspects revealed from the research was affiliated with knowledge creation and sharing through internal networks. It became apparent during interviews and field observations that managers were utilizing safety information received (internally and externally) to encourage decisive action on mitigating risks in their respective areas or across the plant. There was a strong desire from leaders to learn from other departments or sites and adapt accordingly. This style of leadership was likened to knowledge management. Table 8 highlights a few applicable definitions for knowledge management based on a literature review performed by Tzortzaki and Mihiotis (2014). Each definition provides a distinct depiction of the various aspects of knowledge management observed as operationalized at Site A.



**Table 8 Conceptual Definitions for Knowledge Management (Tzortzaki and Mihiotis, 2014).**

Conceptual Definitions of Knowledge Management	References
Knowledge creation, which is followed by knowledge interpretation, knowledge dissemination and use, and knowledge retention and refinement	De Jarnett (1996)
Knowledge Management is the process of capturing a company's collective expertise wherever it resides and distributing it to wherever it can help produce the biggest payoffs	Blake (1998)
Knowledge Management is the management of information, knowledge, and experience available to an organization, its creation, capture, storage, availability, and utilization in order that organizational activities build on what is already known and extend it further	Mayo (1998)
The process that creates or locates knowledge and manages the dissemination and use of knowledge within and between organizations	Darroch (2003)
The use of knowledge so that the entire company works together to address given business challenges and seize covert opportunities	Buckman (1998)

The leadership team also constantly monitored the company's other sites for safety-related injuries, shared the information with employees, and discussed if those injuries could happen at the plant. This knowledge sharing of safety issues that occurred at other sites and the open discussion of their potential relevance encourage and motivate employees to learn from failures at other sites and prevent similar safety problems from occurring. As information is shared from other sites to Site A, it is analyzed to determine what could happen from a safety perspective at the plant. Then steps are taken to implement proactive measures for mitigation. Leadership was also cognizant of using learnings shared by other sites to make improvements as described by two managers.

*“The P-SIF report is shared by HSE with relevant departments where the information is reviewed to determine whether there is potentially an impact to the site. We will take an action to prevent this incident. Once we already have an action, and then we report to HSE, we may send that an action for this incident has already been implemented at our site. Then no need to worry because we already have a standard on how to prevent this issue.” – Middle Management 3*

*“I believe perhaps for the best if we kind of improve the project knowledge by identifying the potential risks. This is something that we, I would say, that we need to improve. I also offer feedback to [the HSE Manager] as well to learn how to provide the skill for these people to really see what are the potential possibilities. I mean, because we need to kind of use imagination and the exposure of the team are having from other sites.” – Senior Manager 5*

Knowledge creation and transfer occur when management collaborates with subordinates internal to their group and across multiple teams to discuss options for optimizing production processes. Discussions are also held to exchange views on improving designs and features for new or modified capital projects.

Anytime there is a near miss or unfortunate occurrence, managers, HSE, and impacted employees in the area take part in lessons-learned sessions with interest in preventing recurrence. Lessons learned sessions are implemented by shifting away from blame in order to focus on the root cause and resolution. One manager recollects the incident investigation process.

*“When there is an incident to investigate and find the root cause, we do not blame the people but take a learning into the future to not have a repeat incident.” – Middle Management 3*

In some regards, knowledge management becomes more of a social process embedded in everyday routines. Collaboration becomes a key component of knowledge creation and dissemination in these situations. Some of the methods used for collaboration include (1) information displayed on TVs across the campus, (2) Microsoft Teams, (3) Excel spreadsheets used for status tracking, (4) e-mails, (5) files placed in folders on the shared drive, (6) the occupational health and safety management system application, (7) daily debriefs, (8) shift huddles, and (9) monthly safety committee meetings. Managers invigorate subordinates to voluntarily share what is seen, encountered, or experienced through expressing care and encouragement. The various platforms for sharing information permit message delivery that

promotes multiple modes of intervention to support safety. Managers and a frontline worker share their perspectives on the information dissemination processes.

*“There are different avenues for sharing. It can be turned to emails and to the meetings” – Middle Management 1*

*“If there are any good catches or near misses during the daily shift huddle (SQP daily meeting), we will share through MS Teams so that all of my team members will know, may implement and make improvements in their areas.” – Middle Management 2*

*“We send it, and the report is in an Excel format where we can send also, attach the pictures and it contains information about who found it, and what's the station...” – Non-Management 9*

The monthly Town Hall meetings serve as a platform for communication between management and the general workforce to talk about business and safety. From the employees' standpoint, the Town Hall meetings allow employees to learn more about the company, the current status of the business unit, and progress towards accomplishing established metrics and goals for the plant. The assembly also offers an occasion to share executive decisions made at the corporate level and site leadership team strategies for local implementation. As one manager recalls:

*“Monthly Town Hall meetings serve as a platform for communication between management and the general workforce. We talk about Health, Safety, and Environmental during the monthly Town Hall meetings.” - Senior Manager 2*

The Town Halls allow management to inform workers about important company information, including safety. Employees interact with management by asking questions and offering feedback. The meetings help employees understand the values within the organization, general business updates (including HSE), status for HSE and other site performance metrics, and topics senior leadership constitutes as necessary for employees to be mindful of while at work.

Senior leadership and the HSE Department have implemented Management Review as part of complying with ISO 14001 and 45001 standards. Management review aims to routinely evaluate

whether the Occupational Health and Safety Management Systems are performing as intended and producing the desired outcomes. The management review process permits regular examinations of safety management systems to identify incipient deficiencies before evolving into more significant problems. Therefore, the site leadership team has periodic management reviews to check the status of open safety action items in every department to ensure that no outstanding safety corrective actions remain open. As a couple of supervisors noted when sharing about management reviews,

*“High-level meeting in management review to review open action items in every single department to make sure no outstanding near misses or observations remain open.” - Middle Management 3*

*“Only high-risk near misses and observations are reviewed during management reviews as minor corrective actions are resolved immediately.” - Middle Management 5*

#### **4.2.5 Safety Resourcing**

Human resources play an instrumental role in creating and maintaining an organization’s occupational health and safety management system. A sufficient number of dedicated safety positions lays the foundation for effective safety programs. It also reassures business compliance by allocating resources to be responsible for fulfilling regulatory and internal company requirements pertaining to occupational safety. Professionals with formal training and experience related to safety responsibilities can share knowledge, train and interact with employees, and raise general awareness relative to various safety topics. Having dedicated safety professionals whose functional responsibilities are to develop and drive safety initiatives sends the message to associates that safety deserves full-time attention and is critical to the organization’s overall performance. Investing in resources focused on occupational safety eliminates the potential for competing priorities or individuals becoming overwhelmed due to multiple functional roles within

a large organization. Managers share their perspectives relative to HSE and staffing at the plant.

*“I think the most important element is the human resources. She mentioned resources, but I believe it's human resources. Because I think that the human resources are the most important, and because we have to do these safety measures from our heart and otherwise it will not be possible.” – Middle Management 6*

*“Dedicated HSE team members who are involved are the most important element of the plant's safety program. The dedicated HSE team is able to focus on the safety programs that need to be implemented for the site... HSE can be more focused and involved with the people from the working area.” – Senior Manager 5*

#### **4.2.6 Safety Participation**

Positive reinforcement is one method used by the plant as an incentive for employees and contractors to identify workplace hazards proactively. Recognitions are also used to acknowledge employees who set exemplary examples in abiding by and following established safe work practices, make significant safety improvements, and develop innovative ways to integrate safety at work. The Excellence Award is one such recognition for exceptional contributions to safety. The Excellence Award is given to individuals or teams with major safety accomplishments. The award is presented to selected recipients during regularly scheduled town hall meetings. Excellence Awards administered monthly during the town hall meetings are given for multiple categories, including safety, quality, and performance. However, a criterion was established that in order for other non-safety awards to be granted, an individual or a group must be identified and recognized as a safety award recipient, which signals the priority of safety over other goals at the plant.

Management supports and drives frequent positive reinforcement related to advancements in safety. Senior leadership discusses proposed candidates for the Excellence Awards during Site Leadership Team meetings, and award recipients are identified. Rewarding safe behaviors and positive feedback appear to be powerful motivators for employees within the organization.

Management understands the importance of recognizing self-initiated acts of hazard mitigation when employees are volitional about protecting themselves or others. Moreover, it is an innate response for people to like and feel good when being praised for the work performed. Consequently, acknowledging outstanding performance inspires and incentivizes others to speak openly about safety and offer feedback, as commented by a senior manager:

*“Employees are so happy to receive the Excellence Awards... This is part of the encouragement for them to speak up and offer feedback.” - Senior Manager 5*

Managers often visit different areas, such as the production floor and laboratories, to observe employees performing their work and provide feedback on safety. Positive feedback related to safety is rendered in many forms, including accolades during supervisor-employee conversations, verbal expressions between peers, and highlighting model employee behaviors in meetings. Each of these sends a signal to employees about their behaviors, organizational values, and norms. Supervisors routinely pass out “vouchers” (also referred to as spot awards), which can be redeemed for meals or goods at the company store to employees who go above and beyond regarding safe operations. Recognizing employees for such behavior incentivizes these employees and others in the workplace, as evidenced by the following comments.

*“We have an on-the-spot recognition. It’s something like a voucher. So, we give them to appreciate any subordinate that is escalating the issue or has good performance, or gives any idea about improvement. So, we can ask for the voucher from the HR and then give it to anyone.” - Non-Management 7*

*“The spot recognitions are given to employees for making significant contributions to safety. It consists of a voucher which can be exchanged for food, a snack, or something in the company co-operative (company shop).” - Middle Management 2*

Management at the plant utilizes vouchers and other types of incentives to develop a culture where employees are empowered and focused on identifying, reporting, and addressing opportunities and potential safety risks. The empowerment of employees is significantly dependent

upon management's ability to encourage employee involvement in creating a safe workplace where employees feel comfortable speaking up and raising concerns. This means the development of a forum within the workplace where constructive feedback can be offered, which may contradict established routine methods, traditional procedures, or management's opinion. There also appear to be criteria or standards that permit management to gauge the constructiveness and utility of the feedback rendered by workers. Model examples for resolving unsafe conditions are highlighted and broadcasted by management. This is in addition to employee rewards with a voucher or other recognitions. Speaking up about unsafe conditions or risky behaviors can be intimidating due to the negative connotations of correcting colleagues, calling attention to the need for refinement, or highlighting inadequacies. However, the HSE Department and middle management take the lead in signaling to employees that senior management is interested in and willing to act based upon employees speaking up, whereby employee motivation to report is enhanced. Absent this approach by management, the workforce may see potential downsides as outweighing perceived benefits. Therefore, management promotes the potential benefits of speaking up, which encompass rewards (vouchers) and recognitions (Excellence Award), idea implementation, and improved business performance (safety Key Performance Indicators) to offset impediments related to possible negative perceptions. Employees share their experiences related to company rewards as follows:

*“But any employees, any employees who want to speak up and wants to talk about quality and also safety, and the company will reward them with vouchers, that they can redeem at the company for a local corporate gift.” - Non-Management 9*

*“On the spot reward (voucher) is given whenever we see something dangerous and speak up to the supervisor. Receipt of the voucher depends on what is conveyed to the supervisor and whether it is constructive and can influence the future. If someone sets an example for safety, others will be informed about this during the daily briefings, and it will be rewarded with something like a voucher. Receipt of the voucher depends on whether the good example will make for a better future.” - Non-Management 6*

It is important to note that the safety incentive program at the site is based on safety activities and behaviors for employees to improve safety rather than simply focusing on one specific outcome. In other words, the rewards and recognition programs refrain from concentrating on just injury reduction, which has historically proven to have unintended consequences such as underreporting or concealment when injuries occur. Instead, the Excellence Award and other spot awards are designed to be linked to leading safety indicators such as good catch and near-miss, participation in activities and learning about a particular safety topic during HSE week, safety improvement ideas, process improvement suggestions, participation in safety walks, safety committee attendance and engagement, preparing and leading safety topics to share with co-workers during shift huddles, and management safety inspections.

#### **4.2.7 Safety Compliance**

Site A demonstrates its commitment to workplace safety through well-written safety policies and procedures. Effectively implementing the policies, procedures, and documentation to ensure compliance is equally crucial. Such policies and procedures provide a basis for organizational culture and create a foundation for safety practices exhibited by interactions between management and their direct reports. Production procedures were also developed to equip operators with instructions on safely operating machinery, reducing the potential for injuries. Members of the production team offer comments about adherence to policies and procedures.

*“Here, we have procedures to manage how we work and then how they do an inspection. It is all managed under the procedures, and then this person is already trained. I believe that they will perform the inspection by following the procedure.”*  
– Non-Management 7

*When equipment protections are added to a production area, equipment engineering will inform the area to ensure they follow the policy or rule when they work in the area. – Middle Management 2*



*We make sure employees understand the safety rules and how to follow safety requirements. - Middle Management 3*

Metrics associated with regulatory compliance, hazard identification, reporting, and resolution are part of the annual goals for Site A. Employees are trained on situational awareness, which enables workers to recognize hazards in the area to protect themselves and others. Workers are also asked to speak up whenever at-risk behaviors are observed. As a result, employees identify and report unsafe acts and conditions to determine what happened and implement a resolution. Management encourages and fully supports these efforts through ongoing area monitoring, appropriate regulatory compliance training, and tracking and follow-up on corrective actions, as indicated in the following examples.

*“Situational awareness is an area of improvement where associates are learning to recognize hazards before they start work to protect themselves....Each person is responsible for checking the situations in their respective areas to ensure good catches and near misses are reported directly.” - Middle Management 2*

*“If there is something unsafe, then we have to report it to our supervisor.” – Non-Management 8*

Mandatory safety training is conducted at Site A for all employees initially and annually after that, reinforcing safety knowledge, competence, and awareness. Safety topics are also covered during recurring site-wide monthly Town Hall meetings to build safety knowledge and competence. Annual events, such as HSE Week, broaden and deepen employee awareness of various safety topics which apply to their roles and responsibilities within the organization. Managers share a few examples of the different modes of training.

*“And every year, annually, there is which is called, HSE Week, where they will provide the people, the employees will be given a quiz. And they will learn about the process, and then they will be informed about the potential dangers.” – Middle Management 7*

*“When we have a new requirement and conduct training to all regular employees to make sure they're all aware about the change and can follow per our expectations.” - Middle Management 3*

*“Monthly Town Hall meetings serve as a platform for communication between management and the general workforce. Talk about Health, Safety, and Environmental during the monthly Town Hall meetings” - Senior Manager 2*

Procedures were also implemented and enforced at Site A to ensure workers wear personal protective equipment to minimize exposure to any hazards that might cause injuries or illnesses. Company requirements stipulate that personal protective equipment is provided to and worn by employees to reduce worker exposure to hazards and to promote well-being. Personal protective equipment included gloves, safety glasses, coveralls, face shields, earplugs, and safety shoes. Employees offer clarification regarding stipulations for personal protective equipment in the workplace.

*“And they always have to wear the protection equipment, for example, like, hand gloves and goggles or the ear plugs, and they should not violate that. And they should be well-equipped, protection equipment.” – Middle Management 7*

*“It is compulsory for everyone to wear safety gear. And so, I haven't seen anyone not wearing this safety gear when I'm working here. So, it is actually compulsory. So, it is required for everyone to wear those gears” – Non-Management 5*

Local procedures were also developed to define and outline the steps for facilitating a robust review of changes to processes, equipment, or systems to mitigate risks to employees and the business. Safety was integrated as part of the manufacturing management of change process. Cross-functional teams convene to conduct hazard identification and risk assessments by studying equipment design and production processes to verify the inclusion of required safety systems, compliance with local and national regulations, and elimination of potential hazards, as indicated by the following statements.

*“We have hazard identification and risk assessment; also, we have a few periodically.” – Middle Management 4*

*“But then outside of routine, you have non-routine, you have projects, you have facility upgrades, you have engineering upgrades. So, then what's clear around those is a pre-risk assessment. Okay, what could go wrong, formally sitting down and saying, ‘What could go wrong.’ ” – Senior Manager 4*

*“Any change we have completed, then we need to share, and that person will make sure that they follow our safety standards.” – Middle Management 3*

Before commencing any scope of work for capital projects, contractors receive a safety orientation and complete job safety assessments. Construction contractors and vendors performing services complete a Job Safety Analysis to mitigate their exposure by documenting planned control methods to perform each job task safely. The job safety analysis indicates the tasks, work environment, tools to be used, hazards, and each of the corresponding control measures. The HSE department inspects and monitors project work performed by contractors and external vendors to ensure that requirements conveyed by Site A are followed. Two managers comment:

*“When there is a project, our contractors will complete a Job Safety Analysis prior to starting work. HSE will review the information, and if a preventive action has not been completed, they will ask the vendor, supplier, or contractor to complete it.” – Middle Management 3*

*“Contractors receive safety induction/orientation by HSE for awareness of HSE Programs with validity for 1 - 2 years.” – Senior Manager 2*

#### **4.2.8 Safety Performance**

Safety key performance indicators (KPIs) are tools utilized to evaluate and improve safety management processes. Using these indicators provides a measurable way to understand the ability and willingness of employees to act safely, understand and prevent hazards, and promote an injury-free work environment. KPIs also serve as a way to communicate safety issues throughout the organization. Company A frequently uses KPIs to drive safety performance. The KPIs are

established at a corporate level. However, the business unit drives resolutely to achieve the prescribed KPIs to minimize health and safety risks. The plant enters KPIs in an Occupational Health and Safety Management System equipped with dashboards. Major KPIs include Management Safety Walkthroughs, Near Miss, Good Catch, Total Recordable Injury Rate, and Lost Time Injury Rate. The following manager notes the use of KPIs:

*“I have some HSE Key Performance Indicators (KPIs), including Near Misses, Good Catches, HSE Walkthroughs, and Corrective Action Preventive Actions (CAPAs) I need to complete. ... At the beginning of the year, the main KPIs from HSE are cascaded to the department head, who cascades down to the shift heads. Shift head shares the KPIs with supervisors, process heads, line leaders, and team leads who have to report this information.” - Middle Management 2*

The plant’s inveterate process for accomplishing KPIs is to cascade and distribute among departments and teams. Management at the plant takes a top-down approach where supervisors provide assignments to team members. Nevertheless, management also emphasizes a bottom-up approach in that employees are continually asked and subsequently offered feedback. Respective team members are routinely encouraged to take the necessary steps to reach established objectives. Distribution of goals promotes ownership, clarifies accountability, enhances connectivity, and contributes to efficiency in attaining targets, as indicated by the following remark by a supervisor:

*“Production has the following targets: 0 P-SIFs, 4- 5 Good Catches Monthly, 4 - 5 Safety Walkthroughs monthly, 4 - 5 on-time CAPAs, attend HSE Committee Meetings 4 per quarter or 10 - 12 per year. Line leaders encourage the operators to give feedback on good catches and near misses to meet the KPIs. This is how we convey KPIs from top to bottom.” - Middle Management 2*

The plant has instituted multiple meetings and gatherings to share information and provide status updates. These regularly scheduled meetings serve as a forum to remind and follow up with employees on KPI progress. The communications are geared toward management providing relevant, up-to-date information on attaining safety goals, while direct reports provide an update

on progress made toward assignments. As the meetings provide a mechanism to highlight any safety concerns as well as actions to resolve the issues, they keep the business moving forward and ensure all teams are held accountable for their responsibilities as discussed by a manager:

*“Every day, we talk about safety first, any critical safety items. What is the status for your KPIs? Are there any good catches and near misses? The daily SQP Meetings are comprised of Tier 1 and Tier 2, where Tier 1 is from process head to shift head, and Tier 2 includes the department head. The Tier 1 Meeting is at 8:30 AM, with Tier 2 at 9:00 AM. Safety-Critical items are reported and discussed.” - Middle Management 2*

To attain the level of commitment for engagement of frontline workers, the leaders demonstrate that outcome performance linked to KPIs can effect change and drive continuous improvement. Management does this in several ways, which include: (1) obtaining and reviewing the data submitted in the HSE management system; (2) identification and resolution of failed process controls; (3) timely response to safety concerns, gaps, and improvement opportunities; (4) implementation of new safety controls to reduce risks; (5) establishing a strong culture of reporting and correcting the problem; (6) encouragement to report KPIs and responsiveness to submissions by immediate supervisors and line leads; and (7) disciplined leadership involvement in day-to-day activities to promote safety in the workplace. These actions motivate employee involvement to proactively report, which appears to have contributed to the site's success in achieving its excellent safety record.

#### **4.2.9 Effects of Leadership Styles on Employee Safety Behaviors at Site A**

Considering the three leadership styles and employee safety behaviors, this analysis provides plant-level insights into the mechanisms that resulted in superior safety performance. The analysis suggests that management practiced facets of Transformational Leadership, Transactional Leadership, and LMX to influence employee safety participation and safety

compliance at Site A. Management displaying Transformational Leadership within the organization emphasized a unified vision of safety, which inspired workers to take action by volunteering to support safety initiatives. By “walking the talk,” consistently demonstrating a commitment to safety in the workplace, and acting with integrity, motivational role modeling was a catalyst for safety participation as workers imitated the behaviors of Transformational leaders. Transactional leaders who facilitated and encouraged Knowledge Management established a bridge between safety participation and safety compliance as knowledge creation and sharing through internal networks impacted the conduct of employees to comply with company requirements and to participate in discretionary safety activities. Top management demonstrated qualities of Transactional Leadership by accommodating Safety Resourcing to accomplish organizational goals and tasks related to safety compliance at Site A. A dedicated HSE department was created to implement programs to aid workers in complying with local regulations and internal requirements related to occupational safety. Supervisors displaying qualities of LMX cultivated partnerships with their subordinates and peers based upon trust and collaboration, influencing personnel to take on additional safety-related job tasks outside of their typical daily responsibilities. The enhancement in safety compliance and safety participation, in turn, led to outstanding safety performance at Site A for multiple consecutive years.

### **4.3 Site B**

Site B was established in 1996. In 2022, Site B had 271 full-time employees with demand and output of approximately 805,950 units of product with annual revenue around \$260M. Most employees had a qualified education, bachelor's, or master's degree, with several employees having a doctorate degree as indicated in Table 9. The average tenure with the company was between 10 – 12 years. 61% of the employees are males and 39% females. Table 10 below reports

the employee distribution by age, and it shows that the majority of the workforce at Site B were experienced and seasoned professionals.

**Table 9 Education Levels at Site B**

Education Level	Number of Employees	Percentage
Doctorate Degree	12	4%
Masters Degree	62	22%
Bachelors Degree	85	30%
Master Craftsman/Industry	20	7%
Qualified Education (e.g. mechatronics, business, MedTech, E-Tech, admin.)	101	36%
Total	280	100%

**Table 10 Demographics for employee age.**

Age Range	Percentage of Employees (%)
34 and younger	17
35 - 44	29
45 - 54	31
55 - 64	21
65 years and older	1

Site B is comprised of multiple departments responsible for different aspects of the business, including Production, Quality, Research & Development (R&D), Research & Development Engineering, HSE & Site Facilities, Manufacturing Science & Technology, Technical Services, Technology & Systems, Supply Chain & Operations, Procurement, and Regulatory Affairs. The highest number of employees work in manufacturing and R&D laboratories. The types of operations in the plant consist of assembly production lines, hardware and software stations, and administrative office spaces. The potential hazards for the production,

laboratory, facilities, and warehousing areas include:

- Lasers
- Lifting, pushing, pulling
- Electrical
- Slips, trips, falls
- Cuts and lacerations
- Powered industrial truck operations
- Hazardous energy
- Strains and sprains
- Contusions
- Pinch points
- Exposure to moving parts
- Hazardous Chemicals

#### ***4.3.1 Partnerships Fostered by Trust and Collaboration***

The leadership team at Site B worked diligently for many years to establish work practices to encourage active employee support of the occupational health and safety management system. Initially, the site had challenges with workers being reluctant to consider improved, more proactive ways of working due to a false sense of security based on experience and tenure. Several years ago, the HSE team, under the guidance of the general manager, took the lead in expressing the need for associates to partner with the department to participate in the development of safety procedures and daily work practices to have a personal stake in the safety process. The HSE Department suggested a variety of ways workers could partner with HSE to offer support, such as:

- performing regularly scheduled safety walks,
- being mindful always to wear PPE,
- obtaining supplemental training to become a site emergency responder,
- identifying and resolving near misses and good catches,
- leading safety training, and
- obeying established safety policies and procedures.



It is a natural tendency for workers to be willing to support initiatives that they help to create and roll out. This encouragement to partner for development was established at all organizational levels. Over time and with consistent efforts, the partnerships between leaders and followers to support workplace safety became the norm of how the site conducted business, and safety became integrated into the routine day-to-day activities. Safety became alive and practiced throughout each of the three locations of Site B, as indicated by a manager's retrospect.

*“So we engaged the associate, we make them feel that they are part of it. You understand. They are part of this process. And anytime you make the people part of the process... You see. Make them a partner. It always works. If you try to impose things on the people, it will not work. But if you give them the feeling, and you make them part of the process, as partner of the process, it always works. Because they have experience, they see things. They know how things can be improved.” – Middle Management 1*

As a result, management and employees routinely and consistently partner to achieve safety outcomes at Site B. Workers willingly volunteer to support safety initiatives based upon dyadic relationships between leaders and followers built upon trust. One manager shares:

*“First of all, I've been telling the associates that we can never achieve anything without the enormous support of the associates. So we have achieved this based on the conviction, the associates, they have, that whatever they are doing, it is for their own interests.” – Middle Management 1*

Employee participation in communicating hazards and risks is vital to the success of the safety programs, given the obscure risks present in the workplace. The success of the safety management system at Site B relies upon the interactions between management calling for associates to take responsibility for speaking up and taking action to rectify unsafe conditions. Site B established goals and objectives related to the standardized methods for identifying and correcting hazards. Targets for key performance indicators were set annually for near miss and good catch reporting, as indicated by the following statements:

*“I believe every one of us is responsible [for safety at the site]. When we see*

*something happening, or something that's not ... Yeah, not safe, we all should say something.” – Non-Management 1*

*“So everybody has to make sure that they are using the tools that they are able to use. Everybody has to provide feedback in case they see any kind of potential risks. So I would always say it's everybody here. So it's not only one person, it's everybody.” – Non-Management 4*

*“Every employee. That's a very simple answer. It goes up over the manager, but it's not only the top management. It's every employee, everyone working here has this responsibility. And not only for his own. He also has responsibility for his coworkers around here.” – Middle Management 2*

*“And if we see somebody who is not doing the work or the task in a correct way, we immediately take him by the hand and ask him and educate him what is going wrong, what is, what he is doing wrong or what the person's doing wrong and, educate him to do it the correct way. And this ... Everybody is doing this. Everybody who is seeing another one who is not doing the task in a correct way, then he is going to help him.” – Senior Manager 3*

Positive relationships between leaders and followers enhance the company's safety culture as workers become part of the solution for maintaining workplace safety. Involvement also prevents employees from becoming disinterested or feeling incapable of contributing by sharing insights related to operational risks. Workers freely volunteer to take the lead and support the occupational health and safety management system by facilitating safety training, serving as fire wardens, and occupying roles such as first aid responders. Employees provide tremendous support to participate in safety actively, and employees become partners in maintaining a safe workplace, as voiced by a few associates.

*“We've implemented a lot of measures to promote health and safety at the site. And one of the main things which always helps us to achieve a safe place is to involve the associate in everything that we do. We have a policy of not imposing measures on the associate, but to develop with them together.” – Middle Management 1*

*“So, this year, I volunteered for the working space related safety training. So, this is one training just for our colleagues in the R&D, and I volunteered to hold that for my colleagues.” – Non-Management 1*

*“So there's a high number of employees who are volunteering for the first aid crew*

*or to be on the first aid team. They do not... It's not a problem to find, and actually, potentially, there are more people who would be eligible to be on a first aid team than they are actually needed. So there's a lot of employees who have some kind of first aid training that would make them eligible to be on the first aid team, more than they need actually. And so there is no problem to find new staff. More staff for this responsibility.” – Non-Management 2*

Site B has additional voluntary positions, such as laser safety officers, which require education or certification above those needed for the company to fulfill typical roles and responsibilities within the organization. The laser safety officers are the individuals designated by Site B with the duty and accountability of serving as subject matter experts related to the evaluation, operation, control, maintenance, ongoing monitoring, and training of the workforce on laser hazards. Non-management employees currently volunteer to take on these added tasks due to being the ones that interface with the hazards daily. Frontline workers have the potential to be directly exposed to operational hazards as they perform their job tasks using standard operating procedures. A senior manager reflects and shares:

*“And they are people of the employment, and so the accountability and the ownership is directly in the teams. So it's not the management who is responsible for being the Laser Safety Officer. It's an employee on the ground...people which are responsible for it. And it's not their... Yeah, it's like a voluntary engagement for the extra work.” - Senior Manager 2*

#### **4.3.2 Unified Safety Vision**

The leadership team at Site B establishes the vision for the organization along with the goals necessary to achieve targets. The vision from the general manager and top management defines the direction and future outcome desired for the occupational health and safety management system. The site's goal is to minimize chances for accidents to happen and ultimately not to have any accidents. The site leadership team communicates an inspirational vision to employees to minimize and eliminate accidents in the workplace. Management then plans,

schedules, and implements specific activities aligned with the identified objective of zero injuries to employees. Top management provides the foresight of what implementation of the planned safety initiatives achieves. The clear and direct depiction of the desired future state drives the daily decisions to make it a reality. By leadership conveying and demonstrating a consistent message annually of zero injuries in the workplace, congruence and unity were developed amongst employees to align with these expectations. Associates understood and communicated the desired outcome that no one would be hurt or become ill at or in transit to the site, as explained by a few employees:

*“We do seriously year by year take care that no harm happens to any of our employees... My priority is to have zero accidents. So, it's one of my goals. So, I really have to take care.” – Middle Management 2*

*“Really in all of it, we are trying to achieve zero incidents where people get hurt or issues which could lead to people getting hurt. We are trying for this; that's the target.” – Senior Manager 2*

*“So for top management regarding work safety, it's about prevention of accidents happening and regular trainings to create an awareness so that things that are discussed during the training stay top of mind.” – Non-Management 7*

### **4.3.3 Motivational Role Modeling**

Workers at Site B have ample opportunities regularly to observe their managers taking cues from them about what is considered acceptable behavior at work. If workers believe that site leadership is devoted to ensuring a safe and healthful work environment, they will likely imitate the behaviors accordingly. It would be hard for employees to take the HSE policy and safety procedures seriously if they saw their manager not in compliance. Inconsistent behaviors would send the wrong message that safety is not valued or important. For Site B, management not only conveys and enforces the company HSE policy and safety standards, but they also serve as role models of thinking and acting regarding workplace safety. The safety of employees is

management's ultimate priority, and management at Site B puts the interest of its employees first, demonstrating by example, acceptable safety behaviors as indicated by the following remarks.

*“The priority of all the top management and the middle management in the company is to put the interests of the associate first.” – Middle Management 1*

*“So, I always say, ‘If you are in a hurry, walk slowly.’ I can't stress this enough, and also, the senior associates and managers, they must show, their responsibility and their mindset by good example. So, we don't... We will not gain anything if a manager or a senior member of the staff, if they do not respect this culture of safety, if they drive away quick, too quickly, or drive fast, or if they are running on the aisles, if they want our associates to finish a job quickly in the evening. It's not a good situation. So what if we walk on the aisles with two phones in our hands... Yes, this is not what we would like to see, and it's not an acceptable behavior. So, the good example by the senior members is what is very important here.” – Senior Manager 1*

*“Top management's purpose is to ensure that we have a safe work environment and that also our workplace is safe.” – Non-Management 5*

#### **4.3.4 Recognition & Rewards**

Recognition and rewards are given to employees for exceptional achievements and exemplary behavior related to safety. Employees are given vouchers and recognized for informing management about unsafe conditions so that they may be eliminated. General compliance with the HSE policy and safety standard operating procedures is an expectation and compulsory for all workers, so these types of efforts are not rewarded. These requirements are written in worker contracts with the need for acceptance for employment. Three employees offer insights about the different awards offered at Site B.

*“[Site B] has introduced something... An award for associates. So if an associate does something good, they get a voucher for Amazon or something like that. 40 euro. There is a kind of motivation to motivate the people. – Middle Management 1*

*“The same also in the category of HSEs, they can nominate the associate for this reward, and every month we sit together with the works council and find the winner. And then the winner is being quarterly appreciated in our Town Hall meetings.*

*Yeah. And then they get also 40 euro voucher for an internet shop where they can get stuff they like, you know.” – Senior Manager 7*

*“So historically, we had it independently as part of our Town Halls. So you, in general, can always nominate a person in regards to our Quality behaviors, and it also includes Safety. If someone did something special or we say, okay, this was a good idea, you can always nominate these employees. The management then will decide on the big bunch of people that they have in a bucket. And they decide, okay, which of them will get some kind of reward, like some kind of benefit of it. So this was a manual process, but this was changed, and we are now also part of the [employee rewards and recognition application] tool. I guess in the future, it will be communicated via this tool. So it's similar. You can always nominate someone for doing something special that includes also Safety. Then this person will get points, and based on those points, the person can choose between some things that they would like to have, and they can exchange the points for products.” – Non-Management 4*

#### **4.3.5 Policies and Procedures**

The corporate office established a global HSE policy to emphasize the organization’s commitment and approach to occupational health and safety management. The business also implemented a code of conduct, various corporate HSE standards, and local site-level procedures to serve as a foundation for employees to follow expectations on ethics, integrity, competency, respect, and professionalism in the workplace. HSE policies, standards, and procedures were instituted to ensure worker compliance with company and regulatory requirements. Site B had rolled out all of the corporate HSE standards at the local level. Employees were introduced to the company HSE policy during onboarding and refresher training was shared annually, as conveyed by a couple of managers.

*“We have placed the HSE policy in our training, in our annual training.” – Middle Management 1*

*“Of course, there's a lot of global policies that are in place. Like with regards to third parties, working on-site, suppliers. With regard to working at heights. Ergonomics, we have written out an SOP, or a guideline on ergonomics this year only, which pertains to office workers and manufacturing workers. We have crisis management HSE environmental SOPs. It's a worldwide global, on a global scale these policies are in place. And we have all of them implemented.” – Senior*

### *Manager 1*

Site B has local standard operating procedures to provide written instructions to employees on the steps necessary to perform tasks safely. For example, procedures have been established to prevent lone-worker situations to minimize employee risk exposure. Other procedures specify that machine operation and testing must be performed in a safe state to reduce or eliminate hazard exposure. Computer maintenance management systems, including maintenance procedures, reviews, and preventive plans established for devices, fixtures, and technical equipment within the company, have been set up to ensure that systems are safe, properly functioning, and in top condition. Test equipment and procedures are utilized to verify the proper functionality and availability of personal protective equipment such as electrostatic dissipating (ESD) shoes. Several senior-level managers offer their perspectives on local procedures.

*“We have procedures in place that do not allow people if they are alone. If they are alone in the evening, they are not allowed to work in the labs any longer.”- Senior Manager 3*

*“For ESD safety, you need to have a certain resistor between you and the floor. And that's checked on every day. And people need to be trained to do these things, and that's also in the responsibility of that person.” – Senior Manager 4*

*“Since I've been here, in these 22 years that I've been with this company, facility management has evolved a lot. We have set up maintenance plans for all devices and technical equipment, and fixtures within the company. It starts from electrically-opening gates to climate control devices, or any fixed installations, the heating, so it's at least 50 to 60 different types of technical devices and plans and installations that we are taking care of and ensuring in [each location] and all the facilities. And we are taking care of them and making sure that they are safe and technically flawless. So, we are looking at the companies who are maintaining the reports of the companies who are maintaining them, and we check whether everything is okay, whether we need to buy parts or schedule any repair in advance.” – Senior Manager 1*

Recurring walkthroughs across the entire building are conducted by top management to identify and quickly resolve unsafe conditions. During and between walkthroughs, employees

proactively look for things that don't look like they used to or are not working well in their work area. Employees identify and report unsafe conditions to determine what happened and implement a resolution. In addition, workers identify opportunities for continuous improvement in occupational health and safety.

*“We have regular walkthroughs in the building by the safety manager and [General Manager] to observe if there are any safety-relevant issues. So, for example, boxes that stand in the way or too many cables hanging around. These issues were documented, and measures are taken, and they were discussed within the monthly trainings”. – Non-Management 2*

*“It is very strenuous because every four weeks, going through all the departments. We have about eight, nine, ten departments. Very strenuous. And these things are going to be worked and eliminated within four weeks. – Middle Management 1*

*“It depends if somebody figures out that something is nearly to go defective and will be then a danger for the worker. They'd tell this to the responsible person who is in charge to fix it that it's safe for the worker.” – Non-Management 3*

Procedures are in place for Site B about incident management. Incidents are reported to management, and management works with employees to determine what happened, why it happened, and the reason behind the occurrence to prevent it from occurring again, as depicted by the following employee statements.

*“They will, of course, investigate; okay, why did it happen? Is there a possibility to avoid it in the future? If there is, they, of course, will try to implement any kind of measurements, so it will not, it will not happen again. And if it's something where you say you cannot make any measurements, then maybe also retraining, making the people, other employees, aware of it and tell them what not to do. Or, what should you be focusing on when you do the same situation.” – Non-Management 4*

*“Then further search for the reason why something happened. So, what was wrong? What happened? To find the source, the reason, and to eliminate it, so it's not going to happen again.” – Non-Management 1*

Standard operating procedures for hazard identification and risk assessments are assigned to employees. Operators, technicians, and engineers perform risk assessments to identify hazards



in the workplace, analyze and evaluate risks associated with the hazard, then determine and implement actions to mitigate or eliminate the hazards. Safety signs may also be posted in the workplace or on equipment to provide employees with the information needed to act safely and avoid potential risks. Based upon the information provided on safety signs and included in standard operating procedures, personal protective equipment is provided to and worn by employees to minimize worker exposure to hazards and to promote well-being, as expressed by the following comments.

*“And there's also, for example, an assessment of risks for any new activities, work activities.” – Senior Manager 1*

*“Together with these external consultants, we develop hazard assessments of the lab space, of the office space, specifically in R&D and of production and, also, for the workshop that you saw, that we saw during our walkthrough and logistics. So, it's basically like a general hazard assessment in the corresponding departments, and then general measures are derived to mitigate potential hazards. And, these are the measures that we turn into our own rules and that are then implemented.” – Senior Manager 6*

*“We have signs in the building at the doors to attend the employees to be cautious. So, at every laboratory, there are signs to use laser protection glasses.” – Non-Management 2*

*“So, to be honest, a lot of it is just natural to us. So, we switch on the light. We wear our protective gear. We put on safety shoes. It's in our DNA. We do not have to think about it very much, or we do not have to be reminded or encouraged. It's just, this is the way we work. It's just... it's our everyday life.” – Middle Management 9*

Additional commonplace work practices at Site B help cultivate a safe working environment and keep employees informed about local activities related to HSE. These different initiatives include regularly scheduled Town Hall meetings, mandatory annual safety training, and key performance indicator updates shared with employees as part of the Town Hall updates. Other topics covered as part of regularly scheduled updates include upcoming audits, conformance reviews, inspections, site visits, and safety volunteer opportunities. Safety topics are also covered in recurring sitewide monthly Town Hall meetings to reinforce safety knowledge and strengthen

competence. Mandatory safety training is conducted for all employees initially and annually, reinforcing safety knowledge, competence, and awareness. Key performance indicators on safety are used to monitor and track safety performance, comply with regulatory requirements, and maintain a safe work environment for employees. A few associates recall the following:

*“We have this meeting once a month with the whole company. There is also always a part for the safety, what is safety relevant. Especially, for example, with the winter, or the autumn coming, there is also a part with, how to behave when you're going to, or you're coming to work, on the way to work.” – Non-Management 1*

*“So internal, I must say, whenever there is something new or also updates or whatever, then it's communicated via our Town Hall. There are always updates in case there are changes to, I don't know, regulation standards. We have exit, signs everywhere now. Historically there were none, but, of course, when the time came, and there was a change in regulations, I set it all up. They clearly try to highlight the evacuation paths.” – Non-Management 4*

*“I think we have a good background. We have different safety trainings, yeah. It starts in the beginning when you start your trip at [Site B], with the general safety training. But, we do have once a year general safety training, for general topics. But also, in our case, for laser safety trainings. And special trainings for our department when we work in the labs, or around our office. How you handle the gas cylinders. And also, how you treat the laser... you have to be careful with the laser light, and you have to put on the laser warning signs on the door. And it depends on the laser light, the wavelength, which goggles you have to wear. And you need safety shoes for some areas and things like that. It's [safety training] in the beginning of the year.” – Middle Management 9*

*“So, the HSE key performance indicators are shared with the associates during our Town Hall meetings. The associates are aware that we have [the HSE management system application], and we have those indicators, because our biggest gifts are, we have a site leader who is more safety conscious.” – Middle Management 1*

The site has general employee contracts with business goals related to safety behavior, cooperation, and incident minimization to underscore the criticality of the code of conduct. Employees who demonstrate unsafe behaviors are issued reprimands to improve their conduct at the facility and establish a safe workplace for all employees, as indicated by the following examples.

*“So, we have these contracts or agreements on goals, and, of course, a lot of things are contained therein. I also have mine, as I'm reporting to [the General Manager], I have my own agreements on the goals I want to reach, and it's not only... Where also the business goals are not only the project goals and the tasks, but also HSE and the issues of behavior, cooperation are part of our general agreements, and also of my personal agreements with my superior. So I'm not only responsible that the trainings are going... But I'm responsible that the trainings are going well, for example, or that we have as little incidents as possible. That's also part in the, in our agreements, in our goals or agreements.” – Senior Manager 1*

*“If you don't use the guidelines you have...it can be a, you could, you get a reprimand. And then you don't get the best results in your PMP process. And everybody knows it's an open process. You definitely know if you don't wear safety shoes in manufacturing, and your manager sees it... you have an injury. But even if your manager sees it, you can get a reprimand, and then you don't get... you have less money at the end of the year.” – Middle Management 7*

#### **4.3.6 Safety Participation**

Management at the manufacturing facilities expressed genuine care and concern for associates in various ways. Some offerings to promote well-being and safety included ergonomic furniture, an onsite fitness center, occupational health services, vaccinations, and wellness coaching. It also involved listening to employee feedback related to requested changes to optimize working conditions. Management acted accordingly to address any concerns when raised, so every employee felt comfortable and safe in the workplace. Expressing care for the needs of its employees gave workers the general feeling that management cares, which in turn promoted safety participation. Top management's sincere interest in employees' well-being caused them to feel safe, healthy, and comfortable in the workplace, as disclosed by the following statements.

*“Safety of all employees, of every employee. So, we're not only safe, but healthy as well and feel comfortable working here.” – Non-Management 1*

*“I'm very content, and I feel well-informed, and I feel the company takes good care and is well engaged in our safety. And also during the two years of the pandemic, I felt very well looked after, and I felt that the company looks after their employees.” – Non-Management 2*

*“It's not just a phrase. It's really a commitment we want to take care on our*

*employees.” – Middle Management 2*

*“Working with [Site B] before, and knowing [General Manager] quite well, he seems very focused that the employees have a safe environment to work in, and they are happy, and that they are in their workplace. You know. That there's a good- we called it, always, the [Site B] family.” – Middle Management 8*

Ergonomic furniture and equipment are provided for employees at Site B to minimize the risks of musculoskeletal disorders and promote wellness. Management understands the necessity of having good ergonomic furniture to assist with correct employee posture, reduce the risk of strains and sprains, and sustain workers as they perform routine tasks in production and administrative areas. Minimizing the potential for pain ensures that workers at Site B are free from distractions and capable of performing at their best. Management sees the value in investing in ergonomic furniture to enhance physical and mental well-being and to mitigate the risk of employees being away from the office due to work-related ergonomic injuries or illnesses. Associates offer their perspectives on ergonomics in the workplace.

*“We get ergonomic chairs and tables, any colleague who needs them for a medical reason, and I've never seen any discussion about anyone not getting this equipment or getting the ergonomic equipment when they say they need it.” – Middle Management 9*

*“Even the chairs and the tables we have here, so I have invested in height adjustable tables last year. So, every employee has a height adjustable table to be able to stand up because the highest risk for me is that they get some back issues because they're sitting too much. So, we have to spend time a little bit and motivate them to move around, stand up, sit down, walk a little bit in between. That's something we do frequently.” – Middle Management 2*

*“Ergonomics here in our office... so everybody can get a specific guidance on how to sit ergonomically, and how to organize themselves in an ergonomic way... And also, the company is really open to change the tables, for example, to a swiveling table if the employees don't want to sit all the time, and wants to get a chance to change there between sitting and doing the work in an up front position... They get a special assessment, yeah, also on a regular basis by our... It's... I think it's, they are not a doctor, but they are supporting us in any physical aspects of the employees... So, it's occupational health service. Yeah, it's an external service*

*provider for occupational health service. And they are here onsite also on a regular basis, and provide this... Yes, per request, yeah.” – Middle Management 5*

Management ensures vaccination and other occupational health service availability for workers to promote employee well-being. The site leadership team and HSE department take more of a holistic approach to health services considering various lifestyle factors, including fitness, diet, stress, and mental health. An onsite fitness center and fresh fruits at the reception area are available for employees. Beverage stations are located around the office building to allow associates to partake in coffee, tea, or other beverages during lunch and break time. A third-party vendor is brought onsite periodically to assess and guide workers on appropriate postures and ergonomic furniture and equipment use. Fitness coaches are brought to the workplace to demonstrate the proper use of workout equipment at Site B. Events with external companies are also sponsored by the HSE department to address topics such as mental health and reducing stress at work, as communicated in the following examples.

*“During this COVID, we had a vaccination. The vaccines were not available. And we, through our efforts and with the support of our management, we were able to have the vaccine, Moderna, for the people to have, because, in Germany, people were vaccinated thrice.” – Middle Management 1*

*“So, it's a lot of little aspects that build up to the whole picture, like a mosaic. For example, there are also these health aspects. When somebody travels to a foreign country, like Florida, for example, or India, it is in our charters that they have to get a session with the company's doctor, and they have to get an advisory session on whether they need any medicine, whether they need vaccination, what are the hazards, health hazards in such countries. So, and this is, it is important that they do that, and it is important that they have that so they know that we want them to come home healthily and safely. Of course, when somebody travels within Central Europe, we usually don't have to give such advice, but to farther countries, we do that.” – Senior Manager 1*

*“And we also often, or historically, like prior to COVID we have also, I think it was in September or something. And so we always have one week which was driven or had the highlighter healthiness. So they made different agendas where you could participate. They had a fitness trainer. He came here and he walked through the offices and we were trying to do stretching and stuff like that. So showing the*

*people, okay, what can you do to get your back a little bit better.” – Non-Management 4*

The turnover rate for Site B is negligible due to workers feeling comfortable and safe in their working environment. As evidenced by the previous demographics for the business unit and the comments below, a considerable number of associates have been with Site B for over 10 or 20 years. Employee job satisfaction results in occupation longevity and low turnover within the company. This observation aligns well with the finding of prior research (Huang et al., 2015) that workplace safety may also impact other factors, such as employee turnover, which may directly correlate to the effectiveness and success of a business.

*“And secondly, the turnover from associates is very minimum. We have people who are over 30 years at the site. We have people who are over 25 and 28.” – Middle Management 1*

*“I think the vast majority of our employees are having fixed contracts. So we are a team which, the most of us are ten years at [Site B] in R&D.” – Non-Management 2*

#### **4.3.7 Safety Compliance**

Regulation is a significant influencer of occupational safety and health at Site B in Germany. The law mandates the integration of occupational health and safety as part of the education system, and German regulation stipulates requirements for occupational health and safety in the workplace. The country's regulations oblige companies to have Management Reviews quarterly, and safety is routinely discussed as part of Management Reviews to identify and address any adverse trends within a designated period of time. Lastly, regulations indicate the General Manager as legally accountable for safety at the site. A manager offers perspective pertaining to German occupational safety and health regulations:

*“The Management Review helps the site to identify trends. If there is any trend going on in the site, then based on the management review, it will be addressed*

*within a specific period of time. So, for example, if there is something going on in one department for a long time, or within a short time, or it has started arising, then these things are going to be depicted, and in the Management Review. And this is going to be addressed within four weeks of time. And besides this, the German law also obliges us to have our HSE meeting reviewed on a quarterly basis. There's a law called Betriebsverfassungsgesetz. And in the Betriebsverfassungsgesetz, everything has been detailed into it, and this is very good. And this Betriebsverfassungsgesetz also names, takes its part from the German constitution, which says that the dignity and health of a person cannot be touched. And this is where the whole thing started. So, the German constitution is embedded with safety. Also, there's also one of the laws which says that a person should not be damaged. It is also part of the German law. And from there, they also developed the German occupation health and safety law, being the Arbeitsschutzgesetz.” – Middle Management 1*

#### **4.3.8 Effects of Leadership Styles on Employee Safety Behaviors at Site B**

Like that for site A, the analysis for site B provides organizational-level insights into the methods that brought about excellent safety performance at Site B. The results suggest that management practiced facets of Transformational Leadership, Transactional Leadership, and LMX, which influenced employee safety participation and safety compliance. Management displaying Transformational Leadership within the business consistently shared a unified vision of safety, which inspired employees to take action by volunteering to support safety initiatives. Transformational leaders rallied workers to support safety daily when demonstrating by example safety behaviors. Management, displaying characteristics of Transactional Leadership, established Recognition & Rewards to recognize employees during Town Halls for participating in and advancing safety. The site leadership team demonstrated qualities of Transactional Leadership by developing Policies & Procedures to accomplish safety compliance, adherence to local regulations, and conformance with company requirements. Supervisors displaying attributes of LMX formed dyadic partnerships with followers based upon trust and collaboration, creating a reciprocal influence in the conduct of personnel to take on additional safety-related job tasks outside of their

daily responsibilities. The increase in safety compliance and safety participation subsequently led to exceptional safety performance at Site B for multiple consecutive years.

#### **4.4 Safety Leadership Impact Framework**

Based on the analysis, two models are proposed to indicate how leadership impacts safety performance, showing how different leadership styles affect key aspects of safety management, resulting in an injury-free workplace. Figure 4 and Figure 5 depict the leadership impact models for Site A and Site B, respectively, derived from the results. APPENDIX 2 presents supplemental supporting data from interviews for both sites that relate to the constructs which were identified from these two case studies.

Figure 4 shows the interaction among the three leadership styles and seven primary constructs contributing to Site A's excellent safety performance. In recent years, three leadership styles were found to play essential roles in the plant's safety performance. But their impact on the seven intermediate variables — unified safety vision, motivational role modeling, partnerships fostered by trust and collaboration, knowledge management, safety resourcing, safety compliance, and safety participation—varies. Safety compliance refers to conformance with regulatory safety requirements and established company safety policies and procedures. It refers to the adherence to the safety code of conduct in addition to holding others accountable for abiding by it. Safety participation consists of voluntary, proactive behaviors and actions that protect others from danger or risk. Motivational role modeling encompasses leaders who are seen as good examples of exemplary workplace safety behaviors for others to emulate, inspiring followers to take similar actions. Safety resourcing refers to providing sufficient dedicated staff to develop, maintain, and promote an organization's occupational health and safety management systems. Knowledge management is the management of information, ideas, and experience so that the organization and its employees have better cognition and resources to achieve safety goals.



Figures 4 and 5 both indicate that transformational leadership, as evidenced by inspirational motivation and idealized influence, links to motivational role modeling and unified safety vision through leadership acting with integrity and communicating a compelling and achievable future state for workplace safety. Management also influenced associates by encouraging them to focus on achieving safety goals, prioritizing safety, and recognizing and supporting employees' needs. The findings reveal that all components of transformational leadership (Bass, 1985) - inspirational motivation, individualized consideration, intellectual stimulation, and idealized influence - are evident and effectual at both sites. Both constructs and various types of recognition and rewards from management collectively promoted safety participation.

Leader-Member Exchange was determined to affect partnerships between management and subordinates directly, and these relationships were undergirded by trust and collaboration. The interactions between leaders and followers would be categorized as high quality due to the inclusive and communicative nature in which employees were entrusted to identify and report unsafe conditions. Management then reciprocated these efforts by openly communicating status for resolution and sharing learnings with other teams. The mutual trust and respect engendered increased employee efforts to create a safer workplace and loyalty to the company.

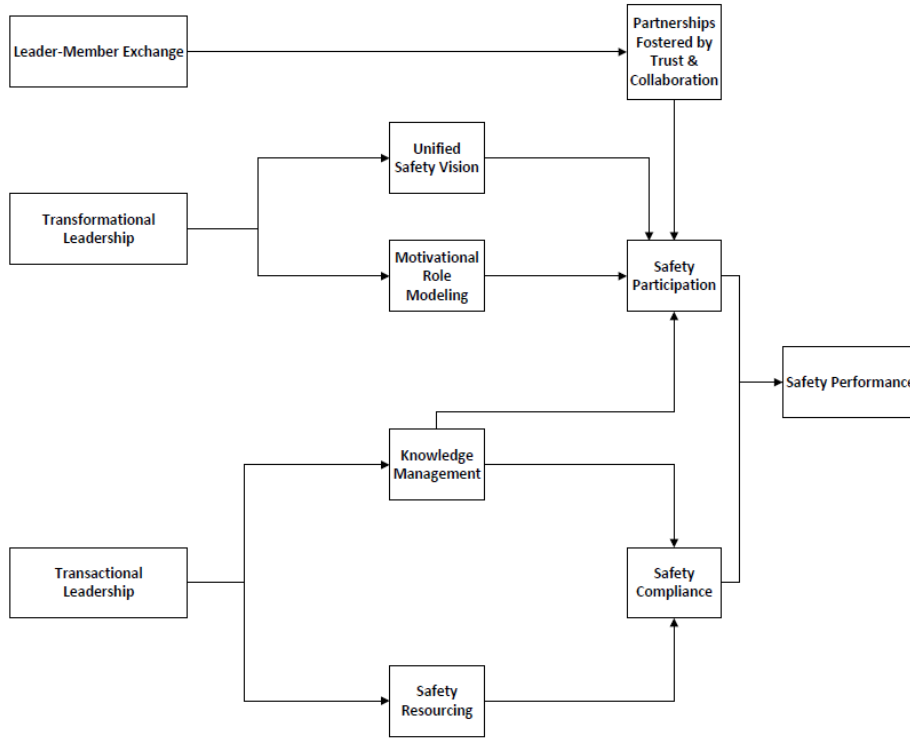
In Figure 4, transactional leadership impacts positive reinforcement of safety through knowledge management and safety resourcing. Management maintains organizational stability through regular social exchanges to ensure employees conform to safety requirements and demonstrate positive safety behaviors. These common social exchanges include daily debriefs, HSE committee meetings, safety training, Town Halls, and various methods utilized to record, track, and provide status for corrective actions associated with near misses and good catches. The multiple mechanisms supporting the daily dissemination of knowledge offer pathways to

compliance with regulatory and company requirements. In addition, Town Hall meetings provide forums for recognizing and rewarding associates who go above and beyond expectations to support occupational health and safety. The incentive programs further motivate safety participation. Top management was vested in accomplishing organizational goals and tasks; therefore, previously, the decision was made to have full-time dedicated HSE professionals devoted to ensuring safety compliance at Site A.

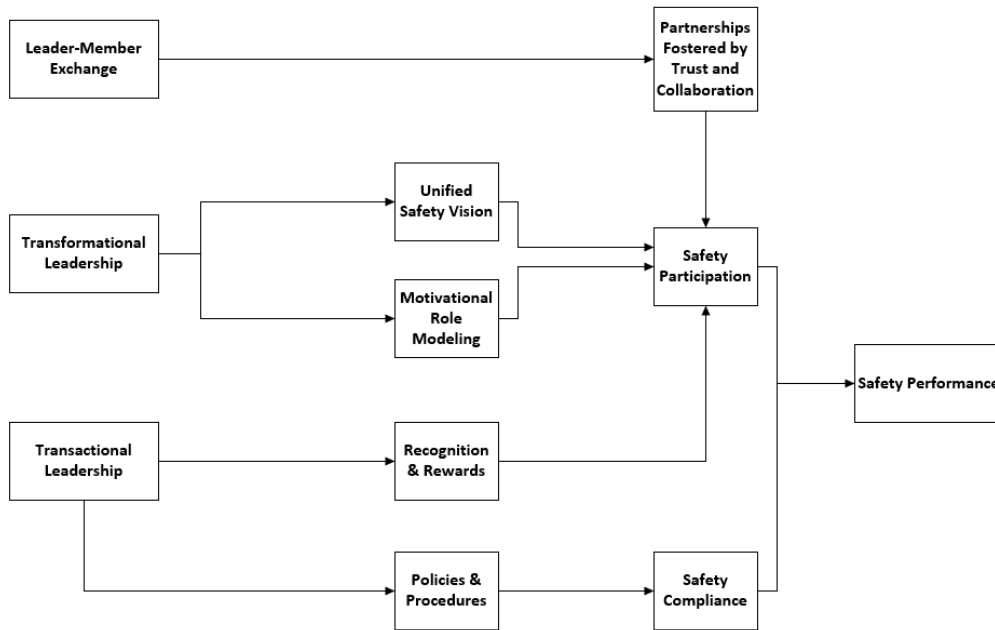
Figure 5 shows the interaction among the three leadership styles and seven primary constructs contributing to Site B's excellent safety performance. As with Figure 4, three leadership styles were found to play essential roles in the plant's safety performance during the current years. But their impact on the intermediate variables — partnerships fostered by trust and collaboration, unified safety vision, motivational role modeling, recognition and rewards, policies and procedures, safety compliance, and safety participation—varies. The previously identified constructs of safety compliance, safety participation, and motivational role modeling also emerged as part of the case study for Site B. Rewards and recognitions are administered to employees to acknowledge and express appreciation for doing something exceptional related to advancing occupational health and safety in the workplace. It highlights a significant accomplishment that serves as an exemplary action for coworkers to follow. Rewards and recognitions are not issued for meeting basic safety requirements as this is an expectation for maintaining employment. Policies and procedures denote the predefined commitments, behaviors, and acceptable courses of action for employees while on the job. These documents clarify accountabilities and responsibilities for health and safety within the organization. Partnerships fostered by trust and collaboration are the dyadic relationships between leaders and followers where routine duties for safety are disseminated, shared, owned, and implemented throughout the organization resulting in

a more secure and healthful working environment. A unified safety vision creates a shared reality whereby employees articulate the common safety goal of zero injuries in sync with management.

Transactional leadership in Figure 5 impacts positive reinforcement of safety through recognition & rewards and policies & procedures. Management maintains organizational stability by clearly communicating requirements, training, and enforcing written policies and standard operating procedures. Management routine work practices include walkthroughs to engage in safety conversations with employees to gather feedback and suggestions. The walkthroughs are also a proactive way for top management to identify and correct unsafe conditions before evolving into more serious incidents. Town Halls facilitated by the site leadership team allow the local HSE team to speak about a variety of pertinent and practical safety topics. The monthly Town Hall meetings also provide a forum for the General Manager and other leaders within the organization to recognize associates for outstanding safety behaviors and interventions.



**Figure 4 Site A Leadership Impact Model**



**Figure 5 Site B Leadership Impact Model**

The safety leadership frameworks developed from this research align with prior studies, which concluded that leadership is an important factor distinguishing organizations with successful safety initiatives and performance from those that are less successful (Krause, 2004). Krause (2004) also conveyed the importance of identifying behavioral practices (such as the antecedents for safety participation and safety compliance in Figure 4 and Figure 5) to be performed by leadership to shape workplace safety outcomes. The research model is consistent with other studies, which found that transformational and the MBE-A component of transactional leadership are strong predictors and key drivers of safety performance (de Koster et al., 2011; Martínez-Córcoles and Stephanou, 2017). However, it is inconsistent with the research by Bian et al. (2019), which identified transactional leadership as having a negative impact on employee safety behavior. The model for Site B arrived at the same conclusion as Kapp's (2012) research when it was determined transformational leadership and the contingent reward component of transactional leadership have direct positive relationship on employee safety participation behavior. Both models differ from the results from Kapp's (2012) study, which indicated transformational leadership practices and the contingent reward component of transactional leadership demonstrated by frontline supervisors were associated with greater reported safety compliance behavior in employees. In contrast, this research found transformational leadership only supported safety participation for both case studies. Likewise, the contingent reward component of transactional leadership for Site B supported safety participation and not safety compliance.

The two models support previous research, which indicated the need for transactional and transformational leadership in the workplace, each identified as complimentary models of the leadership-safety relationship (Zohar, 2002; Yukl, 1998). While there is a clear distinction between transactional and transformational leadership, the two styles tend to augment each other,

as explicated by Bass and Avolio (1997) in the full-range leadership model. Transactional leadership, typically carried out by supervisors, tend to focus on the identification and execution of tasks while getting employees to get their work done more consistently and efficiently. On the other hand, transformational leadership becomes an extension of transactional leadership when management can influence employees to commit to and achieve more challenging goals. Essentially this means that effective managers in the workplace must excel at transformational and transactional leadership (Zohar, 2002).

#### **4.5 Cross-Case Comparison**

In the following, the analysis of each site is complemented with a comparison of how the three leadership styles were applied at the two locations.

Concerning the leadership style LMX, dyadic relationships in support of safety occur at both Site A and Site B. Management and the HSE department at Site A and Site B provide recommendations to employees as part of the partnership on ways workers may support safety initiatives. Both locations also established near-miss and good catch reporting whereby managers and direct reports proactively collaborate to resolve unsafe conditions. The relationships established between leaders and followers at both sites were fostered by mutual trust, respect, and collaboration. Leaders at Site A and Site B also demonstrated the importance of safety often and consistently, serving as a model for other employees to follow. As for the differences between sites, the dyads at Site A were primarily built between supervisors and subordinates, while the dyads at Site B were between managers and followers (i.e., the follower may or may not be a direct report of the manager) throughout the organization. In other words, the partnerships at Site B were established within departments and interdepartmentally. Some of this may have been related to the age factor as indicated by the demographics. Site A consisted of a younger, less experienced

workforce that may have needed additional guidance in learning manufacturing operations. The immediate supervisor would most likely offer this guidance. In contrast, Site B would have more peer-to-peer dyadic relationships due to the years of professional experience and knowledge of more proficient leaders and followers working together.

Regarding transformational leadership, unified vision and motivational role modeling are common constructs impacting safety participation at Site A and Site B. Top management at both locations conducted themselves as exemplars for followers to emulate. The analysis conveyed that frontline workers and middle management respected, trusted, and admired leadership within each organization. It was evident at both plants that management has built relationships with employees to raise their sense of motivation and propriety about safety goals. Leadership at both sites expressed genuine interest in the well-being of employees. Courses of action were established at all manufacturing facilities to hold employees with unsafe behaviors accountable for conformance with established HSE policies and procedures. Workers at any level of the organization could articulate the vision for safety as expressed by the General Managers and site leadership teams. Both sites created opportunities for workers to unleash their full potential and accomplish more than they thought possible by sharing developmental and teaching moments with colleagues. In these moments, personnel who volunteered to serve as facilitators to share safety content would have to ensure thorough understanding and preparation to instruct others. These are beyond their usual assigned roles and responsibilities. Management at Site A and Site B has addressed employees' needs in various ways to the point where there is a general feeling of safety and security while at work. On the other hand, the modes in which leadership supported creativity and innovation differed between the locations. Employees at Site A were intellectually stimulated while working with HSE, engineering, and operations to perform Hazard Identification and Risk

Assessments. In contrast, workers at Site B were allowed to be creative when developing and facilitating developmental training for their own and other teams. Opportunities to develop novel and unique approaches for each site surfaced when management and non-management addressed ergonomic musculoskeletal disorders and other unsafe working conditions in advance. Critical thinking skills enable leaders and followers to develop novel approaches to solving problems and complex issues within each organization. The ways for leaders to connect with employees also varied between the two sites. At Site A, it is primarily done through active listening during shift huddles and daily debriefings on the production floor, whereas top management at Site B participated in two-way conversations with personnel during monthly safety walks.

The results also show that Transactional Leadership impacted employee safety behaviors through different channels at Site A versus site B. While recognition and rewards were evident at Site A, knowledge management and safety resourcing were two primary drivers for effectively getting safety initiatives done. However, the significant catalysts at Site B to accomplish safety tasks and objectives were policies & procedures and recognition & rewards. Germany has extensive occupational health and safety regulations, so much so that they have been embedded within the education system due to their significance. Therefore, it is not surprising that safety policies and procedures were instituted at Site B to meet regulations and internal company expectations related to occupational safety. Although the parent company had well-established policies and procedures, the use and adherence became a major theme during the interviews for Site B, reflecting a prominent role of the safety policies and procedures. Site B also used the rewards and recognition aspect of transactions between leaders and followers to promote safety participation. Leaders would set the expectations related to safety participation, and followers would go above and beyond to achieve those tasks or goals. Contingent rewards were only



provided for exceptional safety performance, as general compliance with standards and policies was an expectation for all employees. Town Halls at Site B were used as the forum by the leadership team to acknowledge selected employees for exceptional safety performance, further reinforcing positive workplace safety behaviors. Leaders at Site A exhibited management-by-exception–active transactional leadership when monitoring subordinates for any deviations from the HSE policy or standards to take corrective action as warranted. In contrast, employees’ formal education, expertise, and experience levels at Site B did not necessitate this level of oversight. Instead, written policies and procedures provided clear expectations for workers. Management enforced remediation plans whenever unacceptable behaviors were demonstrated related to workplace safety. Management’s application of transactional leadership at both plants had the ultimate goal of achieving zero recordable occupational injuries and illnesses.

## 5 DISCUSSION AND CONCLUSION

### 5.1 Summary of Findings

A developing body of research supports the significance of leadership styles in promoting employee safety behaviors (Asad et al., 2021; Barling et al., 2002; Bilgic et al., 2016). Multiple leadership styles are viewed as antecedents to behaviors impacting safety performance in the workplace. Although research has been abundant on the influence of leadership styles, two have been regarded as significant influencers in the workplace, namely Transactional and Transformational Leadership (Christian et al., 2009; Clark and Ward, 2006; Conchie, 2013).

Prior research suggests a causal relationship between safety leadership styles and overall safety performance. Specifically, there is relatively strong evidence that transformational leaders enhance safety-related outcomes (Barling et al., 2002; Innes et al., 2010; Kelloway et al., 2006; Lu & Yang, 2010). Other studies have also demonstrated a fundamental relationship between a transactional leadership style and improved safety performance (Luria et al., 2008; Zohar, 2002a; Zohar and Luria, 2003). Higher levels of safety participation and reduced levels of safety-related near misses have been found in instances where positive leader-member exchanges are exhibited (Hofmann et al., 2003; Kath et al., 2010; Michael et al., 2006).

To address the challenge of injuries and illnesses in the workplace, academics and practitioners have turned to safety leadership styles as one way to improve employee safety behaviors. Earlier studies on leadership focused on aspects that characterized the style and its effectiveness in the workplace (Bass, 1990). In contrast, more recent publications consider the interaction between leaders and followers and the importance of these relationships (Dartey-Baah and Addo, 2018). However, the factors that give rise to these safety behaviors have been underexplored. In addition, there have been scant case studies examining how safety leadership styles impact employee safety behaviors. Minimal research has focused on contextual factors

existing within an environment to enhance leadership engagement and encourage employee safety behaviors (Bommer et al., 2004; Porter & McLaughlin, 2006).

Therefore, it is pertinent to understand the various mechanisms by which leadership styles influence employee safety behaviors (i.e., safety compliance and safety participation), thereby adding to theory and practice in organizational safety. The research establishes proximal factors (i.e., safety compliance and safety participation), distal factors (leadership styles), and the combined effect of how they collectively impact safety performance in the workplace. The study also reveals the mechanisms through which transactional leadership, transformational leadership, and leader-member exchange impact safety performance via the following safety antecedents:

- Motivational Role Modeling
- Unified Safety Vision
- Knowledge Management
- Safety Resourcing
- Policies and Procedures
- Recognition and Rewards

These factors are catalysts for employee safety compliance and participation, and all are important determinants of safety behaviors and safety outcomes.

This study adds to prior research that safety leadership styles contribute to overall safety outcomes. The key to safety success at Site A and Site B is several enablers from different leadership styles that influence employee safety behavior. We find evidence that all three safety leadership styles, i.e., Transformational, Transactional, and Leader-Member Exchange, help drive key safety behaviors for excellent safety outcomes at both plants. Specifically, the leadership at Site A and Site B encourages and motivates employees to focus on safety by demonstrating trust

in the employees. Site A is unique regarding the creative development of different modes of knowledge sharing to disseminate vital safety information. Site A provides a dedicated HSE department due to the importance placed on having successful occupational safety and health programs. Whereas Site B excels due to a heavy focus on regulatory compliance with local policies and procedures implemented to ensure that occupational safety requirements are met. The leadership team at Site B also leverages rewards and recognitions as a way to motivate employees to exceed expectations when volunteering to support safety initiatives. In addition, benefits are provided at both sites to promote employees' overall safety and well-being. Leadership places the employees first at both sites, including their safety and other needs to enhance morale and commitment to the safety goals. The leadership also uses awards to create positive reinforcement and acknowledgment of employees who set exemplary examples in abiding by and following established safe work practices, making significant safety improvements, and developing innovative ways to integrate safety at work. This recognition promotes the safety behavior of identifying near misses, good catches, and management walk-throughs included in key performance indicators. Because employees recognize that following safety policies, procedures, practices, and excellent safety behaviors is recognized and rewarded, it motivates them to work hard to achieve common safety goals. In addition, clear communications and follow-ups on the feedback and resolution of safety issues are essential, and employees feel their feedback is meaningful and valued. Finally, there is a high sense of joint responsibility at Site A and Site B to integrate safety into work areas, creating a significant degree of trust and obligation.

This study confirms the role of leadership in safety in a manufacturing context. It represents one of the contextual studies where leadership styles have been determined to be the direct and primary driver of exceptional safety performance. While prior research has focused on

Transformational and Transactional Leadership styles, this research shows that LMX is also a key component of effective leadership that drives safety performance. The findings are consistent with the full range leadership model in that the research reveals that multiple leadership styles, not just one type, are influential in workplace safety. More importantly, I find that leadership styles impact safety outcomes through several key enablers, such as unified safety vision, motivational role modeling, recognition and rewards, policies and procedures, knowledge management, safety resourcing, safety participation, and safety compliance behaviors. Therefore, organizations should not solely focus on management leadership styles but also on how the leadership styles affect these intermediate concepts.

## **5.2 Implications for Theory**

The study makes several contributions regarding how safety leadership styles promote positive employee safety behaviors. First, the research extends the theories of Transformational Leadership, Leader-Member Exchange, and Transactional Leadership styles and their influences on employee safety behaviors. This study's results support prior literature indicating the positive influence of Transformational Leadership and MBE-A Transactional Leadership on employee safety behaviors (Kapp, 2012; Martínez-Córcoles and Stephanou, 2017). Second, leadership varies depending on the context (Denis et al., 2010). Porter and McLaughlin (2006) call for more attention to the context within which leadership is enacted. Safety leadership studies have focused on the style or behavior of the leader without considering the influence of context on leader activities or practices (Pilbeam et al., 2016). Mirza and Isha (2017) believe that the lack of context is the main reason why questions remain about leadership effectiveness in safety. This study answers the call for more safety research done with a specific context and addresses observations that insufficient case studies exist on the contextual antecedents that drive successful safety performance by identifying factors within the work environment that shape positive employee

safety behaviors. Site A is a large manufacturing facility in an industrially developing country comprised of a predominately female workforce with mainly high school educations. Site B is a mid-size manufacturing facility in a very industrialized country with primarily male workers and employees with advanced degrees. In doing this, the research contributes to the growing body of knowledge of leadership in promoting outstanding safety outcomes for businesses. Third, the study denotes Transactional Leadership as impacting Safety Compliance and Safety Participation, whereas Transformational Leadership was determined only to have affected Safety Participation. The findings align with those of Clarke (2013), who determined both leadership styles impact employee safety behaviors, with Transformational Leadership significantly impacting safety participation and active Transactional Leadership having a greater impact on safety compliance. However, it differs from other studies, which established that aspects of Transformational Leadership positively predicted safety participation and safety compliance, and MBE-A had no significant effect on safety compliance (Dartey-Baah and Addo, 2018).

### **5.3 Implications for Practice**

The results of this research have several implications for practice. Prior research (Bass, 1990; Bass, 1999; Scandura and Lankau, 1996) has shown that leadership styles can be learned and modeled. Thus, training programs can be established to enhance leadership and organizational effectiveness. There is growing interest in offering leadership training to business professionals. A focus on safety-specific leadership training can and should have a discernable positive impact on safety outcomes.

The results show that multiple leadership styles contribute to safety behaviors in different ways, suggesting that future workplace safety performance interventions would be more effective if management exhibits multiple leadership styles, including transactional leadership,

transformational leadership, and leader-member exchange. A training program that seeks to improve transformational leadership, transactional leadership, and LMX for managerial staff may be a cost-effective way to improve safety compliance, safety participation, and safety performance within an organization. Organizations may also develop training curricula on these leadership styles for potential or new managers to educate them on how to be more effective in the domain of occupational safety leadership. In practice, leadership development sessions should include these three leadership styles to achieve the combined effects and full range of impacts on safety behaviors in the workplace. Businesses would benefit from a multi-faceted approach by empowering their supervisors and investing in professional development to exhibit such leadership behaviors in addition to focusing on policies and procedures. Some research indicates initiatives directed at supervisors may improve safety outcomes more effectively than those directed at employees (Zohar and Luria, 2004).

By identifying the mechanisms which impact workplace safety performance, the research highlights areas that may be targeted or measured during intervention efforts to promote safety. Simply put, it identifies contextual factors which may help remediation efforts if promoted. For example, interventions to increase safety participation would be more effective if management at all levels conveyed a clear and consistent vision for safety while serving as an example of exemplary safety behaviors for others to follow. Initiatives aimed at ensuring safety compliance would start by allocating sufficient resources to support safety programs. Dedicated safety personnel would be able to focus on their primary role within the organization, which is to develop and promote workplace safety programs. Studies have highlighted the negative effects of role overload due to multiple, often competing roles, responsibilities, and priorities when attempting to engage in safety leadership (Conchie et al., 2013). Having HSE personnel dedicated to safety

programs within an organization reduces the risk associated with minimal fulfillment of safety obligations when job responsibilities are less demanding. Leadership should also establish routines, tools, and applications to disseminate vital safety information supporting safety participation and compliance. Finally, even in a well-run organization with excellent safety performance, it is essential for leaders and employees to be vigilant by continuously improving various safety dimensions.

#### **5.4 Limitations and Future Research Directions**

While this study has identified essential constituents of successful safety performance, it is not without its limitations. One limitation is that the case studies are within a manufacturing company. Thus, the findings may not be generalizable to other business sectors. Determination of whether findings apply in other sectors requires further research.

The study focused on organizational and contextual factors that impact workplace safety outcomes; however, scant information was shared about individual factors. Research in other safety domains has shown individual personality traits to influence worker safety behaviors (Ghasemi et al., 2021; Jong-Hyun et al., 2018). Future research could consider analyzing the constructs identified as precursors to workplace safety performance at the individual or group (i.e., department or team) level.

While this study demonstrates the robustness of leadership styles in driving safe operations, it represents a case of effective safety leadership already in place. Future research can focus on how existing leadership styles may be modified or updated to improve safety performance. Additional opportunities for future research also exist to examine which of the three primary leadership styles may be most effective in producing robust and sustainable safety outcomes and if there are any contextual nuances where one or more styles may be more or less effective. While



this study identifies specific components within each leadership style as being significant drivers of safety outcomes, additional work on the relative effectiveness of individual leadership style components in driving safety performance also represents an opportunity for future research.

## **5.5 Conclusion**

By examining the mechanism through which Transactional Leadership, Transformational Leadership, and LMX impact employee safety behaviors, this study elucidated what management can do to elicit beneficial safety behaviors. It showed how different leadership styles impact positive safety behaviors, resulting in superior safety performance. Despite the aforementioned limitations, findings from this research have important theoretical and practical implications. The theoretical frameworks derived from the study help improve the understanding of the mechanisms through which transformational leadership, transactional Leadership, and LMX impact successful safety outcomes. The results may also be used by management within organizations to develop training programs that enhance safety leadership and organizational effectiveness.

## APPENDICES

### Appendix A: Initial Coding Scheme

#### Transformational Leadership

Transformational Leadership is defined as leadership that inspires employees to go beyond their self-interest and instead focus on the organization's norms, values, and goals to perform beyond expectations (Bass, 1985; Yukl, 2001). Transformational leadership consists of behaviors in multiple dimensions (Bass, 1990): (a). Idealized influence behaviors refer to the leader acting as a role model to inspire employees. (b). Inspirational motivation refers to communicating an inspiring vision that motivates employees. (c). Intellectual stimulation behaviors consist of encouraging employees to think of new and better ways of doing work. (d). Individualized consideration refers to expressing care for individual employees' needs and supporting employees.

#### Transactional Leadership

Transactional Leadership focuses on day-to-day activities and processes related to promoting an injury-free workplace while conducting business. There are three dimensions of transactional leadership, "contingent reward, management by exception–active, and management by exception–passive. Contingent reward is the degree to which the leader sets up constructive transactions or exchanges with followers: The leader clarifies expectations and establishes rewards for meeting these expectations. In general, management by exception is the degree to which the leader takes corrective action based on the results of leader-follower transactions. Active leaders monitor follower behavior, anticipate problems, and take corrective actions before the behavior creates serious difficulties. Passive leaders wait until the behavior has created problems before taking action." (Judge and Piccolo, 2004, p. 755)

#### Leader-Member Exchange (LMX)

A relationship-based approach would focus on the dyadic relationship between the leader and the follower. In this case, the critical question of interest would be: What is the proper mix of relational characteristics to promote desired outcomes? Investigation within this domain could focus on identifying characteristics of dyadic relationships (e.g., trust, respect, mutual obligation), evaluating reciprocal influence between leaders and followers, examining how the dyadic relationships are correlated with outcome variables of interest, and researching how effective leadership relationships can be developed, maintained, and combined into collectivities of leadership structures.

Given the domains of leadership described above, LMX clearly incorporates an operationalization of a relationship-based approach to leadership. The centroid concept of the theory is that effective leadership processes occur when leaders and followers can develop mature leadership relationships (partnerships) and thus gain access to the many benefits these relationships bring (Graen & Uhl-Bien, 1991). The model, as it stands, describes how effective leadership relationships develop between dyadic "partners" in and between organizations (e.g., leaders and followers, team members and teammates, employees and their competence networks, joint venture partners, supplier networks, and so forth). This occurs when the relationships generate bases of incremental influence (Katz

& Kahn, 1978) necessary for effective leadership.

### **Safety Compliance**

Safety Compliance is the condition of being in accordance with local, state, and national safety regulations. Regulatory reporting entails submitting raw or summary data needed by regulatory agencies (OSHA, EPA, EPD, local water municipalities, etc.) to evaluate a company's operations and adherence to statutes or local governance. Safety Compliance Audits are conducted to examine, verify officially, and document conformity.

Safety compliance is "adhering to safety procedures and carrying out work in a safe manner." (Neal et al., 2000, p. 101)

Quite simply, safety compliance refers to the adherence to the "safety code of conduct" in addition to holding others accountable for abiding by it. Global HSE has a worldwide Health, Safety, and Environmental Policy, and some sites have supplemental local safety policies in addition to corporate requirements.

### **Safety Participation**

Safety Participation encompasses proactive behaviors and actions that protect others from danger or risk. Safety Committees entail co-workers voluntarily gathering on a periodic frequency to identify, recommend, and implement solutions to health and safety problems in the workplace which help to promote an injury and illness-free work environment. Hazard Identification and Reporting involves finding, reporting, and/or resolving potential workplace threats, dangers, and risks. The company utilizes a management system to identify and report unsafe acts and conditions referred to as "good catches" in addition to close calls known as "near misses." OSHA defines a near miss as "an incident in which no property was damaged, and no personal injury was sustained, but where given a slight shift in time or position, damage or injury easily could have occurred" (OSHA 29CFR 1910). Associates participate in safety walks by traveling on foot through the plant while carefully and closely viewing surroundings to identify potential hazards to workers, along with establishing and implementing corrective actions for resolution.

### **Safety Performance**

Safety Performance refers to metrics or key performance indicators used to measure and monitor safety compliance and participation.

## Appendix B: Supplemental Quotes from Interviews Supporting Constructs

Leadership Style	Construct	Representative First Order Data
Transformational Leadership	Unified Safety Vision	"I think a couple of things that have happened over the last few years that I've seen. One is obviously just great communication, on safety. Safety's number one, safety is our number one priority. And we keep telling people everyday safety is our number one priority." - Senior Manager 4, Site A
		"So, the priority for the company based on my occupation for one year and five months is that safety is the priority, the safety of the employees is the priority of course." - Non-Management 4, Site A
		"Zero accidents as a safety goal. No accidents". – Middle Management 4, Site B
		"So I feel that safety is a very important topic for [Site B] and obviously [Site B] will do everything in order to avoid accidents. But it's not only about avoiding accidents. Prevention is also very important." – Non-Management 5, Site B
		"My priority is to have zero accidents. So, it's one of my goals. So, I really have to take care." - Middle Management 2, Site B
Leadership Style	Construct	Representative First Order Data
Transformational Leadership	Motivational Role Modeling	"Of course, we need to motivate them and what is actually the benefit for their safety. It is not for me and not for the company, but for the employee." - Middle Management 2, Site A
		"We give an example to them how we follow HSE requirements. When we give great examples, then they will follow us." - Middle Management 3, Site A
		"Well, I believe that safety is the greatest good that a company could provide to people and make sure that they have a safe work environment, and that's by far one of the most important things." – Senior Manager 6, Site B
		"So, part one of my reply is that, as I always said before, I must set a good example." - Senior Manager 1, Site B

Leadership Style	Construct	Representative First Order Data
Transformational Leadership	Motivational Role Modeling	<p>"Of course, we need to motivate them and what is actually the benefit for their safety. It is not for me and not for the company, but for the employee." - Middle Management 2, Site A</p> <p>"We give an example to them how we follow HSE requirements. When we give great examples, then they will follow us." - Middle Management 3, Site A</p> <p>"Well, I believe that safety is the greatest good that a company could provide to people and make sure that they have a safe work environment, and that's by far one of the most important things." – Senior Manager 6, Site B</p> <p>"So, part one of my reply is that, as I always said before, I must set a good example." - Senior Manager 1, Site B</p>
Transactional Leadership	Policies & Procedures	<p>"We do not work alone in our department. We are advised to have someone with us at overtime of eight o'clock, for example. We shall not work alone in the laboratory if there's something happens." - Non-Management 2, Site B</p> <p>"I would also say that in regards to the assembly team or maybe also service or R&amp;D, they generally have to follow their instruction in regards to safety when it comes to laser safety, maybe also when it comes to assembly of the product. So they are forced to use a specific tool in regard to assembly, so they have to assure that they use this tool. So there's an instruction how you build, for example, a device, and, in general, they also indicate which tool do you have to use to fix something. It's not only in regards to the tiny tools like screwdrivers. You also have bigger tools that you might have to use. For example, shifting one item to another phase. Then you might have to use a big tool. There are instructions, at least for when it comes to assembly. There are procedures described." – Non-Management 4, Site B</p> <p>When I think of the PPE, especially the boots, the safety boots, before using them, we have to be sure that their ESD is confirmed. And every time we wear before we go to the laboratory, we have to test them. There is a special test place, and we have to do this test and then sign a paper, for example, that it is working, and we did it. That is one example for a policy. – Non-Management 1, Site B</p>

Leadership Style	Construct	Representative First Order Data
Leader-Member Exchange	Knowledge Management	<p data-bbox="773 348 1459 468">“If there is a case that happened in other sites, so this person will receive information from the HSE department, and then he will refer the information to us, so we can brief the operator by using this material.” – Non-Management 7, Site A</p> <p data-bbox="773 520 1459 638">“we will take action. And also now, we create in the Microsoft Teams, there is a thing that will update if they found some safety issue or like near miss or good catch. So, from that, we will follow up.” – Middle Management 4, Site A</p> <p data-bbox="773 674 1459 821">“So, each department, each area has its own. For my area, there's a dedicated TV for my area and the others also have their own TV. Especially now during the pandemic, we have to maintain our social distance. So, everybody, every area has its own monitors” – Non-Management 4, Site A</p> <p data-bbox="773 856 1459 1010">“If there are some near miss reports conducted by my colleagues, for example, then this report... I will inform this to my team that there are some incidents or near misses. So, all the team members are aware about these potentials.” – Middle Management 6, Site A</p>
Leadership Style	Construct	Representative First Order Data
Transactional Leadership	Recognition & Rewards	<p data-bbox="854 1167 1459 1352">“There is this recognition system. There are rewards that are awarded, and I believe this is every three to four months. Sure, we have monthly events, but everything regarding exemplary behavior or being aware of safety and such things, such prizes are awarded every three to four months.” – Non-Management 1, Site B</p> <p data-bbox="854 1388 1459 1541">"We have what we call an award system. If an employer identifies any hazards, they will just call us, we will attend to it immediately, because there is this statement, the safety of our employee is our optimal priority." - Middle Management 1, Site B</p> <p data-bbox="854 1577 1459 1755">"And, and as mentioned, you get an award, a [Site B] award if you identify something, and that's also presented in the Town Hall meetings to all employees. That's a commitment you can feel. It has a positive impact and it's coming from the heart." - Middle Management 2, Site B</p>

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Leadership Style	Construct	Representative First Order Data
Leader-Member Exchange	Partnerships Fostered by Trust & Collaboration	<p data-bbox="696 375 1333 432">“HSE Committee meetings are used to upgrade the skills of supervisors and team members” – Senior Manager 5, Site A</p> <p data-bbox="696 485 1409 569">“And then we also need to deliver the HSE material to the subordinates daily during the morning briefing. So, it takes a lot of hard work to achieve that.” – Non-Management 7, Site A</p> <p data-bbox="696 632 1409 905">"I think it's not the responsibility of HSE department. The responsibility is born by every associate in his own or her own way. So, we can, of course, give the instructions and directives and do all the formal things they require but and I have always said that also in... and seen that in audits that I have been a part of or participated in. The responsibility must actually be carried over or taken over by every person, within the organization, so we can provide the tools, but it is every associate's own responsibility." - Senior Manager 1, Site B</p> <p data-bbox="696 940 1370 1058">"So focus on the people, make the people partners of the whole thing, make the people feel at home where they work, and your indicators will be zero. This is how it works." - Middle Management 1, Site B</p> <p data-bbox="696 1094 1409 1394">"This year, I volunteered for the working space related safety training. This is one training just for our colleagues in the R&amp;D, and I volunteered to hold that for my colleagues. And there was one question that I couldn't answer, and with that I reached out to the HSE team. Just wrote them an email, and yeah, it was very easy as I got a response, very, very soon, and they helped me. It was a kind of difficult question (laughs), but, they tried to help me and provide more information. And, that I could give to the other colleagues who had the question. I think that was really good." - Non-Management 1, Site B</p>

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Leadership Style	Construct	Representative First Order Data
Transactional Leadership	Safety Resourcing	<p>"I think the most important element is the human resources. She mentioned resources, but I believe it's human resources. Because I think that the human resources are the most important, and because we have to do these safety measures from our heart and otherwise it will not be possible." - Middle Management 6, Site A</p> <p>"Dedicated HSE team members who are involved is the most important element of the plant's safety program. The dedicated HSE team is able to focus on the safety programs that need to be implement for the site." - Senior Manager 5, Site A</p> <p>"HSE can be more focused and involved with the people from the working area." - Senior Manager 5, Site A</p>



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## VITA

Dr. Michelle McRae Payne has 25 years of professional experience working for the Department of Defense, engineering firms, and companies in the pharmaceutical, food and beverage, and medical device industries. She is passionate about improving employee well-being and implementing more environmentally friendly ways of working. Drawing on a background as a process/project engineer at companies such as The Coca-Cola Company, Merial Limited, and Dean Oliver International, Dr. Payne ensures safety initiatives globally work effortlessly in support of operations to enhance Alcon's production performance.

Highly qualified, with a Master's in Bioengineering and a Bachelor of Science in Chemical Engineering and a strong working knowledge of occupational health and safety regulatory requirements, Dr. Payne brings the technical expertise to ensure worker safety and environmental goals within manufacturing organizations. She also has a Doctorate in Business Administration from the J. Mack Robinson College of Business at Georgia State University. Dr. Payne brings a deep understanding of OSHA regulations and holds extensive HSE qualifications across occupational safety and health, industrial hygiene, process safety management, and many others.

Most importantly, Dr. Payne brings a genuine care and concern for people and is driven to improve the lives of associates and customers. By working collaboratively with teams and stakeholders, she transforms HSE culture, inspiring people to prioritize safe, sustainable working practices.