



Leading for safety: A weighted safety leadership model in shipping



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ABSTRACT

Recent years have witnessed a growing concern for safety and highlighted the importance of leadership in safety practice within high-risk organizations. By following up and integrating the state-of-art research trends, this study aims at (1) bridging a gap in safety leadership research – i.e., the lack of a holistic understanding of safety leadership contribution at all managerial levels within high-risk organizations; (2) developing and validating a weighted safety leadership model in the context of shipping which incorporates key safety leadership behaviors that may enable researchers and practitioners to better understand and exercise safety leadership in shipping organizations. To systematically fulfill the research aims, this study integrates both numerical and descriptive data by sequentially applying three interdependent research techniques – namely inductive analysis of literature, modified Delphi method and Analytical Hierarchy Process (AHP). The study results in a holistic weighted model with concrete safety leadership behaviors at each managerial level, which contributes to the building of theoretical foundations in the domain of safety leadership research and serves as practical standards for accelerating safety leadership development in shipping organizations.

1. Introduction

The credibility of the safety leadership development with regard to the operation of hazardous systems has been notably heightened, with many studies identifying the significant correlates of leadership and organizational safety performance (i.e., [4,15,43]). Initiating or contributory factors to near misses or accidents – such as inaccurate safety management, insufficient training, etc. – can often be traced to the failure of leadership to establish *systemic solutions* to ensure safety [24].

The recent theoretical development of safety approaches (e.g., [28,39]) – inspired by Systems Theory – has stimulated a broader view that expands the safety focus beyond the proximate level to the system as a whole. The decisions and actions across all levels within a sociotechnical system interact with each other and have vital influence on the attainment of the overall safety performance [29]. Leadership for safety must therefore be instilled throughout the organization at all levels, to ensure that all parts are highly committed to safety. Safety leadership development and assessment are consequently required to expand sufficiently to accommodate a wider systemic perspective in order to guide the effort of organizations in pursuit of overall positive safety outcome [11].

Safety leadership studies based upon generic leadership theories – e.g., Transformational Leadership, Transactional Leadership, Leader-Member Exchange (LMX), Empowering Leadership, etc. – have flourished with a vast and considerable literature, supporting the positive effects of managers' leadership intervention on safety compliance, safety

participation, reduced injury rate and near-misses in various high-risk industrial contexts, e.g., oil and gas, process, container shipping, construction, etc. Nevertheless, essential leadership behaviors influencing safety have merely been assessed and identified at one particular managerial level, which reveals the incomplete understanding of safety leadership within the organization as a whole. Additionally, few safety leadership studies have been conducted within the context of shipping. The shortcoming in itself is an indicator of the need for further investigations, with the aim of fully recognizing the key safety leadership behaviors at all management levels. Moreover, to facilitate the empirical training and developing of safety leaders in the shipping industry, a systemic picture of safety leadership addressing concrete behaviors, instead of broad leadership styles, is of considerable value.

In this light, the fuel behind this study is the need to clarify and formulate normative ideas of safety leadership practice, and bridge a gap in safety leadership research – i.e., the lack of a holistic approach to the understanding of safety leadership at various managerial levels within high-risk organizations.

In this regard, this study aims at 1) Identifying key safety leadership behaviors at all managerial levels in high-risk industries; 2) Verifying the applicability of the identified key safety leadership behaviors at all managerial levels in the context of shipping; 3) Developing a *weighted safety leadership model* which enables researchers and practitioners to better understand and exercise safety leadership behaviors in shipping organizations. Drawing upon the state-of-the-art literature reviews,

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inductive analysis (coding), modified Delphi method and Analytical Hierarchy Process (AHP) constitute the research methods of the present study, formulating a blueprint for the authors to systematically integrate theoretical and empirical data to accomplish the research aims.

2. Literature review of safety leadership in high-risk industries

The theoretical development of safety leadership in various high-risk industries has undergone many refinements. However, few studies have focused on identifying safety leadership behaviors in the context of shipping, which indicates the need to extrapolate from the studies that have been conducted in other high-risk industries and use it as a point of departure for developing a model for the shipping industry. Safety leadership studies in high-risk industries are reviewed and classified according to the level of management involved – lower, middle or top management. The review culminates in three tables showing the identified important safety leadership behaviors at each managerial level in various high-risk industries.

2.1. Lower-level management

Lower-level managers – such as operational, supervisory and first-line managers – are in direct contact with the frontline workers and operators, and most closely related with the supervision and control of actual operations. Many studies have hypothesized the transactional and the transformational leadership as the antecedents for manager's safety-specific leadership behaviors [1,14,56]. Transformational and transactional leadership have contributed to the identification of effective safety leadership behaviors. Transactional leaders monitor and control the work that must be done by subordinates, and reward them for successfully completing stated objectives. Whereas transformational leaders demonstrate *idealized influence, inspirational motivation, intellectual stimulation and individualized consideration*, which are recognized as required qualities of leaders that can enhance subordinate's safety performance and concerns [21]. As shown in Table 1, specific transformational leadership behaviors, such as encouraging subordinates to work safely and discussing safety openly, maintaining and initiating a safe working environment, listening to safety concerns, etc., were found to affect the subordinates' attitudes and behaviors towards safety-critical work tasks, as well as to positively correlate with safety compliance and participation [23]. The effect of supervisors' transactional leadership is varying across different high-risk industries. In manufacturing, Clarke and Ward [5] claim that transactional leadership-related tactics – i.e., rational persuasion (for instance using logical arguments and factual evidence to ensure compliance) and coalition (e.g., using co-workers to create pressure for the subordinates to comply) – are directly effective in exerting influence over subordinates' safety participation. In addition, front-line supervisors can effectively encourage subordinates to adopt safety behaviors by exercising transformational leadership behaviors such as promoting involvement in decision making and generating enthusiasm for safety through inspirational appeals [5]. Cohen [6] and Simard and Marchand [47] identified a significant association between the involvement of first-line supervisors in safety work and lower injury rates. In the observational study conducted by Parker, Yule, Flin, and McKinley [37] in healthcare, surgeons' intraoperative leadership behaviors such as guiding and supporting, communicating and coordinating, as well as task management behaviors, were frequently associated with safe team performance. The effect of supervisors' transactional leadership on the subordinates' safety performance is, however, not identified as statistically significant in manufacturing, construction and services industry [13].

Based on the leadership theory that focus on the relational aspects, Hofmann and Morgeson [18] found that high-quality LMX relationship can foster more open and frequent upward communication pertaining to safety issues, which in turn contributes to the reduced injury rate and accidents in manufacturing. Likewise, in other high-risk industries,

such as the nuclear industry, Kivimaki, Kalimo, and Salminen [25] observed that participative management with more communication and feedback was associated with better safety performance. Moreover, as shown in Table 1, a study on Empowering Leadership within the nuclear industry identified six essential safety leadership behaviors [33]. Several studies have also recognized the importance of trust and distrust in subordinates' engagement in safety behaviors. For instance, Conchie, Taylor, and Charlton [8] argue that to reduce distrust between leaders and subordinates the leaders should focus on reducing subordinates' perceptions that a leader lacks care or concern for others' safety. Cooper [9] indicated that *caring* is the crucial factor to effective leadership for high-risk industries. Frontline leaders should demonstrate caring behavior concerned with the welfare of the subordinates, which can promote a good rapport and mutual trust relationships [8,9,56]. These results are consistent with the findings obtained in the container shipping context regarding perceived supervisor's leadership practice, e.g., caring about crew's safety, encouraging safe behaviors, and keeping crew informed of the safety rules [30].

In general, as synthesized in Table 1, transformational and transactional leadership, LMX and empowering leadership-based behaviors, appears to be the means by which managers can exert positive influence over their subordinates pertaining to the safety-related activities.

2.2. Middle-level management

Recent studies have highlighted the pivotal influence of middle managerial positions – a vital link between frontline supervisors and top managers – on organizational safety performance. Middle managers, such as head of department, operational-, line-, site- and fleet managers, execute and implement the policies framed by the top-level to their subordinates. It is of crucial importance that the top-level managers' vision of safety be effectively communicated to the first line supervisors and workers [16]. However, the desired leadership factors performed by the middle management have not been thoroughly examined for organizational safety, only a limited amount of research has been conducted at this level of management.

Cooper [9] suggested that middle managers should be fully involved in establishing safe work systems and safety standards, as well as assisting in risk assessment to demonstrate their commitment to safety as well as their care and concern for subordinates. Flin and Yule [16] note that middle managers are key to transferring corporate safety vision from top managers to lower-level managers. The safety issues and concerns from frontline operations must also be accurately communicated when passing the middle-level on the way up to the top-level management. Accurate and consistent reporting provides a true lens on organizational safety performance and enhances the top management's ability in appropriate safety-related decision-making. In a study conducted in the oil and gas industry, O'Dea and Flin [36] observed that participative management is considered as the best practice in safety leadership for site managers. As when leaders facilitate a 'consulting' and 'joining' relationship with their subordinates, more time is spent in communicating safety issues. Frontline workers seemed to conduct more safety initiative behaviors when the middle managers adopted a transformational leadership style, while a transactional leadership style did not show any significant effects at offshore platforms [16]. Nevertheless, middle-management's involvement in safety initiatives and reinforcement of supervisors' safety activities is identified as critical leadership behavior for safety. By synthesizing the literature, Flin and Yule [16] argue that middle managers' transactional leadership behaviors (such as becoming involved in safety initiatives) and transformational leadership behaviors (e.g., emphasizing safety over productivity, adopting a decentralized style, relaying the corporate vision for safety to supervisors), are possibly applicable to healthcare as desired leadership for safety. Leaders' empowering behaviors have also been deemed important in influencing safety performance: Empowering subordinates to be flexible in times of uncertainty and change increases their ownership and willingness to shoulder the responsibilities and share the information

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