Leading for safety: A weighted safety leadership model in shipping

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A R T I C L E   I N F O

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A B S T R A C T

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.

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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 generich 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...
Table 1
Summary of the identified leadership behaviors affecting safety performance at lower-level management.

| Author(s) | High-risk Industry context | Related Leadership theory | Type of managers | Identified leadership behaviors affecting safety performance |
|-----------|-----------------------------|---------------------------|----------------|-----------------------------------------------------------|
| Clarke and Ward [5] | Manufacturing | Transformational | Immediate supervisor | • Promote involvement in decision making |
| | | | | • Generating enthusiasm for safety |
| | | | | • Using logical arguments and factual evidence |
| | | | | • Using co-workers to create pressure for the subordinates to comply |
| Hofmann and Morgeson [18] | Manufacturing | Leader-Member exchange | Group leaders | • Engage in communication pertaining to safety issues |
| | | | | • Promote more open and frequent communication and feedback |
| Parker et al. [37] | Healthcare | Not specified | Surgeon | • Guiding and supporting |
| | | | | • Communicating and coordinating |
| | | | | • Task management behaviors |
| Flin and Yule [16] | Healthcare | Transactional | Supervisor | • "Monitoring and reinforcing workers' safe behaviors" |
| | | | | • "Participating in frontline workers' safety activities" p. 46 |
| | | Transformational | Supervisor | • "Being supportive of safety initiatives" |
| | | | | • "Encouraging subordinate involvement in safety initiatives" p. 46 |
| Lu and Tsai [30] | Container shipping | Not specified | Supervisor | • Caring about crew safety |
| | | | | • Encouraging safe behaviors |
| | | | | • Keeping crew informed of the safety rules and providing necessary safety information |
| Martinez-Córcoles et al. [33] | Nuclear industry | Empowering leadership | Immediate supervisor | • "Showing what should be achieved and why; explaining not only what should be done, but also the reasons, contributing to giving more sense to the task" |
| | | | | • "Promoting subordinates' self-effectiveness and increasing the feeling that they can accomplish the task" |
| | | | | • "Offering examples of good practices that subordinates can imitate" |
| | | | | • "Developing subordinates’ abilities, which will allow them to steadily increase their contributions" |
| | | | | • "Providing positive emotional support by recognizing good work and taking care of the members’ welfare" |
| | | | | • "Organizing work to enable subordinates to achieve success and derive personal satisfaction from the work, increasing subordinates’ perception of auto-efficacy, and inspiring them to achieve increasingly higher goals" p. 1126 |
| Conchie et al. [8] | Construction | Not specified | Supervisor | • Demonstrating benevolence by caring and concerning for subordinates’ safety and welfare |
| Hoffmeister et al. [17] | Construction | Transformational | Supervisor | • Instilling pride in subordinates |
| | | | | • Expressing safety values to subordinates |
| Hofmann and Stetzer [19] | Large utility organization | Not specified | Supervisor | • Facilitating open communication on safety |
| Wu et al. [52, 53] | Petrochemical | Not specified | Supervisor | • (Safety caring) To respect and trust subordinates, to care about subordinates’ needs and empathize with their problems |
| | | | | • (Safety coaching) To stimulate subordinates’ abilities, to share opinions, and allow subordinates to participate in decision making |
| | | | | • (Safety controlling) To set the rules by which the organization runs, to use their power to give a reward or a punishment and to review subordinates’ behaviors |

The 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, 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 participa-
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