



Ending on a positive: Examining the role of safety leadership decisions, behaviours and actions in a safety critical situation



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ABSTRACT

Safety leadership is an important factor in supporting safe performance in the workplace. The present case study examined the role of safety leadership during the Bingham Canyon Mine high-wall failure, a significant mining incident in which no fatalities or injuries were incurred. The Critical Decision Method (CDM) was used in conjunction with a self-reporting approach to examine safety leadership in terms of decisions, behaviours and actions that contributed to the incidents' safe outcome. Mapping the analysis onto Rasmussen's Risk Management Framework (Rasmussen, 1997), the findings demonstrate clear links between safety leadership decisions, and emergent behaviours and actions across the work system. Communication and engagement based decisions featured most prominently, and were linked to different leadership practices across the work system. Further, a core sub-set of CDM decision elements were linked to the open flow and exchange of information across the work system, which was critical to supporting the safe outcome. The findings provide practical implications for the development of safety leadership capability to support safety within the mining industry.

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1. Introduction

Over the past two decades, a body of research has emerged examining the role of safety leadership in supporting improved performance and outcomes, with important links established between a range of practices, and performance and outcome measures (Clarke, 2013; Yagil and Luria, 2010; Zohar and Luria, 2010).

Traditionally defined, safety leadership refers to the ability of leaders to inspire and motivate followers to achieve common goals (Burns, 1978; Chemers, 1997), with research to date suggesting an overall positive influence on performance and outcomes. However, findings are considered by no means definitive in explaining the relationship. Indeed, a recent review of the literature discussed several deficiencies associated with existing research, particularly in relation to the ability of current conceptual and methodological approaches to effectively describe and examine the influence of safety leadership on performance and outcomes (Donovan et al., 2016). For example, research to date has tended to focus on the overall effectiveness of individual leadership styles in influencing

performance (Clarke and Ward, 2006; Hofmann and Morgeson, 1999; Martínez-Córcoles, Schöbel, Gracia, Tomás and Peiró, 2012; Nielsen et al., 2013). In contrast, few studies have examined the underlying attributes of different leadership styles at the individual level, and their respective links to supporting improved performance (Hoffmeister et al., 2013). As a result, little consensus exists regarding what leadership styles, and indeed underlying behaviours, are the most effective in supporting and promoting safe performance (Donovan et al., 2016).

Furthermore, examining and defining safety leadership purely in terms of a leaders' ability to inspire and motivate followers, has precipitated a dominant focus on exploring leadership style in isolation. This is compounded by the use of questionnaires and surveys as the principal method of data capture (Michael et al., 2006; Nielsen et al., 2013; Zohar and Tenne-Gazit, 2008), which seek to elicit insight into follower perceptions of safety leadership, rather than to explore safety leadership itself from a 'first person' perspective. As such, understanding of processes considered integral to leadership, such as decision making (Collins, 2001; Lipshitz and Mann, 2005; Rogers and Blenko, 2006; Vroom, 1973), remains limited, which points to a considerable gap in the current knowledge base. Therefore, improved understanding of the relationship

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between decision making, and behaviour and action in the safety leadership context, presents as an important research endeavour (Donovan et al., 2017).

Perhaps the most notable shortcoming of existing research however, relates to the lack of exploration, and understanding of safety leadership across work systems (Donovan et al., 2016). The majority of existing research examines the relationship between the frontline worker and immediate supervisory level alone (Conchie, 2013; Hofmann and Morgeson, 1999; Kath et al., 2010a,b). While some research is evident which examines the relationship between leadership and performance at higher organisational levels (Fruhen et al., 2014; Noruzy et al., 2013; Zohar, 2002b), the prevailing focus remains constrained to examining relationship dyads within one work system level (e.g., supervisor-manager relationship (Hofmann and Morgeson, 1999; Zohar, 2002a)). This neglects consideration of factors that exist and interact outside of such dyads, and across multiple work system levels to positively influence safety. Thus, the extent to which safety leadership has been examined across work systems remains largely unexplored (Donovan et al., 2016).

Despite apparent conceptual and methodological limitations, safety leadership is unquestionably an important safety-related concept (Flin and Yule, 2004). To that end, improved approaches to its examination offer the ability to enhance understanding of its role in supporting safe performance within complex socio-technical systems (Walker et al., 2008). The application of systems-thinking methods and concepts present as a valuable opportunity to contribute in this regard (Donovan et al., 2016). Systems-thinking (Leveson, 2004; Rasmussen, 1997) is widely acknowledged as the dominant paradigm for examining and understanding safety and performance across work systems (Goode et al., 2014; Leveson, 2011; Salmon et al., 2017). Indeed, an underpinning premise of systems-thinking relates to understanding the decisions, behaviours and actions of actors across all levels within work systems, which interact to influence performance (Rasmussen, 1997). As such, examining safety leadership through a systems-thinking lens presents as a worthy line of inquiry. In moving beyond conventional conceptual and methodological approaches (Martínez-Córcoles, Gracia, Tomás, Peiró and Schöbel, 2012; Nielsen et al., 2013; Zohar and Tenne-Gazit, 2008), improved insight can be gained into how safety leadership decisions, behaviours and actions manifest across work systems to ultimately support safe performance.

1.1. Safety leadership and systems thinking - Rasmussen's Risk Management Framework

Rasmussen's Risk Management Framework (Rasmussen, 1997) has been previously established as an appropriate systems-based theoretical framework through which to examine safety leadership (Donovan et al., 2017). The framework describes work systems as comprised of six levels; government; regulatory bodies and associations; company management; technical and operational management; staff; and work, and is underpinned by the premise that safety is impacted by the decisions, behaviours and actions of actors across all levels the work system, not just by those of frontline operators alone (Rasmussen, 1997). Decisions at higher work system levels (i.e. Company, Regulatory, Government) should shape actions at lower levels, while information about the current state of the system (i.e. from workers, technical systems and data, etc.) should propagate upwards to inform and aid decision making at higher levels. This process is known as vertical integration (Rasmussen, 1997), and is recognised as critical to supporting safety within high-risk environments.

The flexibility of the framework in application (Salmon et al.,

2014) provides a means by which to examine safety leadership as a positive aspect of system performance, in terms of emergent decisions, behaviours and actions across a work system that assist in the maintenance of safety. Further, the ability to represent the open flow and exchange of information in a safety leadership context is critical to understanding the relationships that exist between safety leadership decisions, behaviours and action, and their ultimate contribution to safety (Donovan et al., 2017).

The aim of the current study was to examine the role of safety leadership decisions, behaviours and actions during a significant mining landslide incident, the Bingham Canyon Mine high-wall failure (Tinto, 2013), using Rasmussen's framework. The incident occurred on April 10th, 2013, when the Mine experienced a significant slide along a geotechnical fault line of its north-eastern wall. In the weeks leading up to the incident, increasing ground movement had been detected, and pre-emptive measures had been put in place where workers, facilities and infrastructure were relocated prior to the slide. At the time of the incident, all operations had been ceased, with all employees safe and accounted for. The incident was selected for examination due to its significance in both magnitude, and the positive safety outcome in which no injuries or fatalities were incurred. The incident provided an important and unique opportunity to examine the safety leadership decisions, behaviours and actions that played a significant role in achieving the positive safety outcome.

Recognising the limitations of previous research (Donovan et al., 2016), a multi-method approach was adopted which included the Critical Decision Method (Klein et al., 1989), and a self-reporting approach to examine the safety leadership decisions, behaviours and actions that contributed to the incidents' safe outcome. Rasmussen's Risk Management Framework (Rasmussen, 1997) was applied to the analysis to demonstrate where the identified safety leadership decisions and actions resided within the work system, the behaviours that supported and aided their execution, and the role of vertical integration in supporting the safe outcome.

2. Methodology

2.1. Participants

Eight individuals from within the mining organisation involved in the incident participated in the study. The participant cohort represented five leadership levels within the organisation. To protect anonymity, the specific leadership levels and roles are not disclosed. The average age of participants was 46.1 years (SD = 8.57), with the average time in role at the time of the incident 2.57 years (SD = 2.82). Formal ethics approval for the study was granted by the Monash University Human Ethics Research Committee.

2.2. Procedure

2.2.1. Data collection

The Critical Decision Method (CDM) (Klein et al., 1989) was used to examine the safety leadership decisions and actions executed across the work system that contributed to the safe outcome. The CDM is a semi-structured interview technique that uses cognitive probes to extract information regarding cognition and decision making during critical incidents (Klein et al., 1989). The CDM has been used extensively to examine decision making and behaviour in different safety critical contexts (Mulvihill et al., 2016; Read et al., 2016; Righi and Saurin, 2015; Wachs et al., 2016). Notably, recent applications have involved examining system wide influences on behaviour by mapping CDM data onto Rasmussen's Risk Management Framework (Goode et al., 2014).

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