



Evaluating the horizontal alignment of safety management activities through cross-reference of data from safety audits, meetings and investigations



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ABSTRACT

Vertical and horizontal alignment within organizations are seen as prerequisites for meeting strategic objectives and indications of effective management. In the area of safety management, the concept of vertical alignment has been followed through the introduction of hierarchical structures and bidirectional communication, but horizontal alignment has been given little attention. The principal goal of this study was the assessment of horizontal alignment within an aviation organization with the use of data from safety investigations, audits and meetings in order to explore the extent to which (1) causal factors recorded in safety investigation reports comprised topics discussed by safety committees and focus areas of internal safety auditors, and (2) the agendas of safety committees include weak points revealed during safety audits. The study employed qualitative and quantitative analysis of data collected over a 6 years' period at three organizational levels. The results suggested a low horizontal alignment across the three pairs of the corresponding safety management activities within each organizational level. The findings were attributed to the inadequacy of procedures and lack of a safety information database for consistently sharing safety information, cultural factors and lack of planning for the coordination of safety management activities. The current research comprises a contribution to the literature and practice and introduces a technique to assess the intra-alignment of safety management initiatives within various organizational levels. Future research is needed in order to investigate the association between horizontal alignment of safety management practices and safety performance.

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1. Introduction

Safety focused organizations such as aviation enterprises use rates of adverse events (e.g., accident and incident rates) as indicators of their safety performance. However, safety management is not exclusively a damage control policy; organizations must not consider success of their safety initiatives only by avoiding accidents or serious incidents (ILO, 2001). Amongst the various safety management activities, safety audits and review meetings comprise correspondingly fundamental components of safety assurance and planning. The former focus on uncovering organizational deficiencies that might jeopardize safety and contribute to accidents if not timely and effectively managed. Safety review meetings (or simply, safety meetings) emphasize on the improvement of safety levels based on information from various sources (e.g., risk registry, accident and audit reports, external and internal benchmarking, regulatory requirements).

As Leveson (2011) argued, establishment of effectively controlled loops across the hierarchical levels of socio-technical systems and exchange of information amongst actors of same and different levels constitute crucial requirements for achieving organizational objectives and avoiding degraded safety performance. The continuous interaction and coordination amongst the fundamental organizational functions of planning, operating and monitoring across all organizational levels, as well as their alignment with each other, constitute an example of a Critical Success Factor (CSF) that reflects an effective management (Karanikas, 2014a). Similarly, when considering safety management, an alignment amongst the frequencies of safety issues discussed in review meetings (i.e. planning function), identified through internal safety audits (i.e. monitoring function) and discovered by safety investigators (i.e. realization of safety management at the operational level) mirrors a common safety focus across an organization and indicates effective implementation of a safety management scheme. The aforementioned views are aligned with the concept and value of vertical and horizontal alignment within

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organizations discussed in academia and professional practice (e.g., Heesen, 2012; Salimian et al., 2012; Simons, 2014).

To date, research initiatives have not explicitly addressed the alignment amongst safety management practices, such an alignment indicating a proportional focus of an organization on respective safety issues. The objective of this study was to assess the degree of horizontal alignment between safety investigations, review meetings and internal audits at three organizational levels of a large aviation organization. The underlying concept of the study was that safety management's common focus at each organizational level is demonstrated when different safety management actors share the same picture of safety issues within those levels and effectively coordinate their actions in order to manage the factors potentially threatening organizational integrity.

The data used in the study corresponded to a period of 6 years and regarded three levels (i.e. operations, middle management and senior management) of the organization under study in order to enable respective comparisons. The results of the analysis showed differences in the emphasis given by safety audits and review meetings with reference to the frequencies of accident and incident factors stated in safety investigation reports, as well as a divergence between the topics included in the agendas of safety meetings and the issues uncovered during audits. Follow-up interviews with safety professionals of the organization attributed the findings to the lack of consistent procedures, poor intra-departmental communication and a missing safety information database, along with a culture pointing more on flaws at the operational level and excluding middle and senior organizational functions from internal evaluations. Those factors had collectively led to a misalignment of safety management activities within each organizational level.

The current study comprises a contribution to the literature and professional practice and introduces a technique that can be used, and possibly extended, by practitioners to evaluate the extent to which safety management practices share the same picture of safety challenges and enact in tandem. Future research is needed in order to explore any linkage between horizontal alignment of safety management activities and safety performance.

2. Literature review

2.1. Safety management and performance

Concerning the organizational performance in general, Stapenhurst (2009) suggested that the achievement of Critical Success Factors (CSF) must have priority against the realization of Key Performance Indicators (KPI). Goglia et al. (2008) viewed performance metrics as the essential way of monitoring and controlling quality of deliverables, thus ensuring that organizations achieve and sustain desired performance levels. Performance indicators are often used as benchmarking references for comparing performance internally, amongst departments, or externally, amongst organizations (Kemp, 2006; Goglia et al., 2008).

Safety management is defined as the application of policies, processes and measures with the scope to prevent adverse safety-related events during the use of a service or product; safety management focus on either the identification of flaws before those contribute to accidents or the investigation of the latter in order to derive aftermaths and correct deficiencies (ICAO, 2016; HSE, 2013). Various safety metrics have been introduced, widely categorised as leading and lagging. Leading or proactive indicators regard safety management performance, whereas lagging or reactive ones reflect safety outcomes, which comprise commonly used measurements of safety performance (e.g., EASA, 2016; ICAO, 2016; IOGP, 2015).

Examples of reactive safety indicators are the number of adverse events and losses (e.g., accidents and incidents, injuries and fatalities), and the fluctuation of their rates. Level of regulatory compliance, percentage of scheduled inspections and audits completed, and number of voluntary reports submitted and processed annually are some examples of leading indicators referring to safety management performance (e.g., ICAO, 2013). Thus, typically, reactive indicators reflect safety performance of services and products and reflect the visible outcomes of activities at the operational level, whereas proactive indicators correspond to safety planning and monitoring tasks.

Currently, international standards and directives claim that if an organization runs a Safety Management System (SMS) effectively, it is expected to improve its safety performance (e.g., BSI, 2007; ILO, 2001; IAEA, 2006; IOGP, 2014). Although the type of safety management system might affect safety performance (Arocena and Núñez, 2010), a strong relation between the implementation of a safety management and improved safety performance is yet a proposition to be proved (e.g., Robson et al., 2007; Thomas, 2012; Kaspers et al., 2016a).

Only few older studies have identified moderate linkages of specific safety management activities and generic organizational factors to safety performance. For example, Tam and Fung (1998) found that post-accident investigations, the level of subcontracted labour, safety awards, and safety training influenced positively safety performance in the construction industry, whereas safety committees, management involvement and safety orientation were not associated with safety outcomes. Vredenburg (2002) showed that only hiring practices were predictive of injury rates in hospitals. A research in offshore companies revealed that favourable safety management scores were associated with lower rates of lost time injuries, safety audits playing a major role (Mearns et al., 2003). The findings of Nga et al. (2005) suggested that safety audits and review meetings scored low in the relative importance of organizational and project-related individual factors on safety performance. A survey of Kaspers et al. (2016b) across aviation companies in the frame of a research about safety metrics revealed few, diverse and occasionally contradictory associations between metrics of SMS processes and safety outcomes.

The variance of findings regarding the relation between safety management and safety performance might be attributed to (1) the different ways SMS processes are implemented and thresholds of safety outcomes are interpreted across companies (Kaspers et al., 2016b), and/or (2) the fact that safety management activities are widely viewed as individual elements and the interconnectivity and interdependency of the respective safety initiatives within organizations are not considered (Karanikas, 2016b). The consideration of such interlinks is of paramount importance since continuous interaction and vertical and horizontal communication in an organization play a critical role in its endurance and success (Vredenburg, 2002; Hofmann et al., 1995) and the distortion and concealment of significant safety information do not enable a common risk perception (Pidgeon, 1991). As Karanikas (2016a) added, the lack of a shared perception amongst management functions hinders the ability of an organization to align its safety management initiatives, and the vertical distance between management and operations does not allow a common approach to safety.

An analogous concept comprises part of a relatively new safety paradigm named System Theoretic Accident Model and Processes (STAMP), which is grounded on systems engineering (Leveson, 2004). According to the STAMP theory (Leveson, 2011), unwanted events do not occur merely due to failures of individual components, but also because of uncontrolled interactions of system elements, lack of feedback loops across hierarchical levels and ineffective communication amongst actors of same organizational levels. Feedback mechanisms and communication channels update

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