Accident Analysis and Prevention 53 (2013) 133–141

Contents lists available at SciVerse ScienceDirect

Accident Analysis and Prevention

journal homepage: www.elsevier.com/locate/aap

Implementing recommendations from accident investigations: A case study of inter-organisational challenges

Alexander Cedergren*

Lund University Centre for Risk Assessment and Management (LUCRAM), Lund University, Box 118, 221 00 Lund, Sweden

ARTICLE INFO

Article history:
Received 7 November 2012
Received in revised form
29 December 2012
Accepted 19 January 2013

Keywords:
Implementation
Accident investigation
Recommendations
Remedial actions
Risk governance
Countermeasures

ABSTRACT

In many industries, a national accident investigation board conducts investigations following major accidents. For safety improvements to be achieved, however, it is essential that the recommendations presented in these investigations are followed by necessary actions. In this paper, challenges related to implementation of recommendations from accident investigations are studied. The theoretical framework providing the foundation for the study lies at the intersection between systems safety, risk governance, and implementation research. Empirical data for the case study was collected from the Swedish railway sector. The first part of the paper presents an analysis of the extent of recommendations that have not resulted in implemented actions. The second part consists of an interview study aiming at providing a deeper understanding of the difficulties related to transforming these recommendations into actual changes. Two key factors that give rise to challenges to implementation of recommendations are identified. The first factor is related to the different actors' views on their own and other stakeholders' roles in the implementation process, and can be described as a trade-off between being insider and outsider to the industry. The second factor is related to the scope of the accident investigations and their recommendations, and can be described as a trade-off between micro-level and macro-level factors. The opportunities for implementing recommendations, and achieving safety improvements at the industry level, are affected by the ways in which the different stakeholders manage these trade-offs at the local level. This study thus mainly contributes by highlighting the importance of co-ordinating the various actors involved in the implementation process, and the results show that challenges to implementation to a large extent arise in the interactions between these actors.

1. Introduction

In the aftermath of major accidents, a number of activities are normally initiated aimed at creating an understanding of why the accident occurred and to prevent similar events in the future. One of these activities involves the accident investigations conducted in many sectors. The investigation itself, however, is merely one of the elements in the process of learning from accidents. For safety improvements to be achieved, it is essential that the recommendations on remedial actions presented in the accident investigations are followed by necessary actions, i.e. that they are implemented. Whereas a lot of research has dealt with challenges related to accident investigation and the methods used in this step, limited focus has been given to the implementation of recommendations (Lundberg et al., 2010; Carroll and Fahlbruch, 2011). This process therefore merits further attention.

Responsibility for the different steps, from accident investigation to implementation of remedial actions, is normally distributed across several different organisations. This is particularly the case for major accidents, where many sectors have a national accident investigation board conducting the accident investigation and formulating recommendations on remedial actions, whereas a safety authority, the affected operators, and other relevant bodies are involved in the implementation of these remedial actions. This process thus involves a variety of different stakeholders.

Taking risk-reducing measures in settings involving a large number of stakeholders is often difficult due to the diverse roles and perspectives among these various actors (Renn et al., 2011; van Asselt and Renn, 2011). This type of challenges potentially also exists in the multi-organisational process in which the findings from accident investigations are transformed into actual changes. To investigate this further in the context of the Swedish railway sector, two objectives of this paper have been formulated. The first objective is to study to what extent recommendations from accident investigations have not resulted in implemented actions, and the second objective is to study the ways in which the interplay

* Tel.: +46 46 288 09 39; fax: +46 46 222 46 12.
E-mail address: alexander.cedergren@lucram.lu.se

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http://dx.doi.org/10.1016/j.aap.2013.01.010

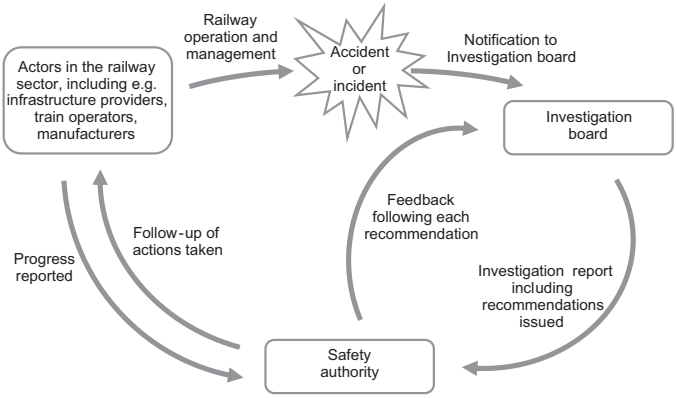

Fig. 1. Schematic outline of the process involving accident investigation and implementation of recommendations.

between different actors influence the possibility to implement these recommendations.

As described above, a similar structure for investigation of accidents and implementation of recommendations exists across many different industries. In this paper, the implementation process in the Swedish railway sector is studied. Section 2 describes the main actors involved in this process. Section 3 outlines the theoretical framework of the paper, which draws upon insights from the fields of safety science, risk governance, and implementation research. Section 4 describes the method and material for the study, which is followed by Section 5 that presents the stepwise approach to identifying challenges to the implementation process. Firstly, the proportion of recommendations on remedial actions that have not resulted in any implemented actions is analysed. Secondly, an interview study aiming at gaining deeper insights into challenges related to implementation is conducted. Finally, Section 6 presents a discussion of the results, and Section 7 highlights the conclusions drawn from the paper.

2. The accident investigation process in the EU railway sector

According to the Railway Safety Directive of the European Union (Directive 2004/49/EC) each member state needs to establish a permanent and independent investigation body, i.e. an accident investigation board, with the task of investigating serious railway accidents and incidents. The objective of these investigations is described as improving railway safety and preventing future accidents. Once the investigation board is notified of an incident or accident, a decision is made whether to initiate an investigation. Where appropriate, these investigations shall contain safety recommendations addressed to the national safety authority or other relevant bodies. A schematic outline of the process involving accident investigation and implementation of recommendations is shown in Fig. 1. The safety authority shall take the necessary measures to ensure that the safety recommendations are taken into consideration and acted upon. As a part of this process, the relevant actors report to the safety authority regarding their progress on the implementation of recommendations. Following each investigation, the safety authority reports back to the investigation board on measures that are planned or taken as a result of the recommendations. The feedback from the safety authority to the investigation board (see Fig. 1) provides the basis for the analysis described in Sections 4 and 5 with regards to the proportion of recommendations that has not resulted in implemented measures. Before this analysis is further described, the theoretical framework of the paper will be outlined.

3. Theoretical framework

The theoretical framework underpinning this paper lies at the intersection of three research fields: systems safety, risk governance, and implementation research. The first field, systems safety, seeks to develop knowledge and understanding of how accidents can be prevented, and is therefore of significant importance to this paper. In the systems safety field, a large number of methods for accident investigation have been presented (for overviews, see for example Dien et al., 2012; Sklet, 2004; Kjellén, 2000). The early models were based on a view of accidents as a sequential chain of events culminating in some form of injury (Kjellén, 2000). However, this relatively simple cause–effect relation is of limited value for explaining accidents that occur in modern socio-technical systems, which are characterised by a high degree of complexity (Hollnagel, 2004; Leveson, 2011). Later developments of accident investigation methods have contributed with a distinction between "active failures" and "latent conditions". Active failures represent errors or mistakes that are committed by individual workers in the operational environment of a system, whereas latent conditions represent deficiencies in design, maintenance, procedures, or automation, which lie dormant in a system. These ideas form the basis for several accident investigation methods, for example the well-known "Swiss cheese" method presented by Reason (1997). Methods of this type are often referred to as epidemiological models. Although they are more complex than the sequential models, they are still based on a relatively linear assumption of accident occurrence, and they have difficulties explaining how latent conditions have emerged and how they interact with active failures (Dekker, 2006; Hollnagel, 2004; Rollenhagen, 2011).

As socio-technical systems have become more coupled, the need for more advanced models has grown. Perrow (1984) argues that systems consisting of a large number of parts that are tightly coupled and interact in non-linear ways are capable of generating unknown and unexpected events. Accidents in complex systems are in Perrow's view therefore inevitable, which is the message behind his concept "normal accidents". According to the same view, Leveson (2011) argues that accidents in complex systems often result from interactions between perfect functioning components. With this perspective, accidents (and safety) can be seen as "emergent" phenomena, i.e. something that cannot be derived from the constituent parts of a system, but rather appear on system level (Dekker, 2011; Hollnagel, 2004; Leveson, 2004). In order to create an understanding of how accidents in complex systems occur, Dekker (2011) has emphasised the importance of studying relations between different parts of a system, and not only the different parts or actors in isolation. In a similar vein, Rasmussen and Svedung (2000) argue that it is often the unexpected side effects from daily, and locally rational, decisions at different levels of a socio-technical system that pave the way for accidents. In this view, the causes to accidents in complex systems are "embedded in the banality of organizational life" and facilitated by an environment characterised by scarce resources, competition and incremental changes (Vaughan, 1996). These processes, involving stepwise acceptance of risk and gradual adaptation, are not well captured by using accident models that look for components that are "broken" (Dekker, 2011). Based on these insights, a number of "systemic" accident investigation methods have been developed (see e.g. Hollnagel (2004) and Leveson (2004)), with the aim of paying attention to the interactions between different parts of a complex system.

The vast amount of different methods for accident investigation can be seen as an indication that development of new methods is the "holy grail" of systems safety research (Lundberg et al., 2010). However, the investigation is only a first step to achieve safety improvements. In order to make necessary changes, it is essential that the recommendations on remedial actions are implemented,