



Organizational contradictions between safety and security – Perceived challenges and ways of integrating critical infrastructure protection in civil aviation



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ABSTRACT

This research article documents results from a survey conducted among employees in a regional Norwegian airline, highlighting challenges and disparities between the way flight safety and aviation security is organized in civil aviation. The results indicated that the introduction of new security regulations in Europe and Norway are changing communication and information sharing at airports. It is argued that these challenges are due to conflicting institutional demands and principle contradictions in the way safety and security are approached within the civil aviation system. This argument is based on descriptions of the organizational foundations for flight safety and characteristics of how aviation security is organized. A theoretical framework characterizing the differences in organizational principles between safety and security is presented, which may also be relevant for other critical infrastructures. The article also describes strategies for integrating critical infrastructure protection. In addition to discussing the survey results, concerns are raised about organizational contradictions between safety and security and the ability of aviation to manage the competing logics and contradictory organizational principles. Not integrating critical infrastructure protection is seen as a systemic vulnerability and, in the case of civil aviation, a concern for both flight safety and aviation security if not sufficiently moderated. The article proposes paying better attention to the organizational realities of aviation operations and performing critical evaluations of existing and new protective measures as possible solutions to the situation.

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1. Introduction

Today's aviation industry must deal with several sources of low-frequency, high-consequence disaster, including technological disasters resulting from bad systems design, inappropriate regulatory frameworks and political and managerial failures, and disasters created by terrorists attacks. The latter is particularly challenging as malevolent actors can adapt their strategies to the security measures taken; thus, their actions are extremely difficult to anticipate. An important research issue is how the development of aviation security interacts with and influences the organizational conditions on which flight safety is produced.

In the current article, we present empirical results that show how the introduction of new security regulations in Europe and Norway after the 9/11 attacks in the United States has produced

organizational challenges in terms of changing the way communication and information sharing is performed between aviation actors and operators in Norwegian aviation, among other challenges. We argue in the article that these challenges are due to conflicting institutional demands and principle contradictions in the way safety and security are organized within the civil aviation system. In this environment, airlines and airports face pressure for dealing with the integration, but there seems to be a lack of an overarching institutional integration between existing flight safety concerns when conducting civil aviation operations and new security requirements, thereby creating a counterproductive situation. These issues, we believe, are also relevant for the regulation and management of safety and security within other critical infrastructures, such as other transportation systems, energy production and distribution, and water supply, as these areas have had to deal with similar rises in concerns over security threats. The issue of conflicting institutional demands and its effects on organizations is a general concern within current theories on organizations and their environment, and suggestions have been made that in certain

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situations such issue can lead to organizational paralysis or breakup (Pache and Santos, 2010). Any developments towards the latter in safety critical systems, such as civil aviation, would be a concern requiring attention.

Earlier studies have indicated that the culture and work processes of Norwegian aviation organizations have been changing through the increased streamlining of operations, with the outsourcing of many services and reduced coordination and information exchange among personnel. This reduction of organizational slack might reduce the capability to adapt to new situations (Pettersen and Aase, 2008). Communication and trust are two concepts that have been applied to explain the organizational contributions to flight safety. Both have been key elements in crew resource management programs, which have been shown to improve flight safety (Courtright et al., 2012). As noted by Weick (1987) organizations that achieve high reliability, such as many airline companies, do so because they stay alert and pay attention to weak signals. Information exchange is therefore of utmost importance. According to Mearns et al. (2013), valuing learning is particularly important in the aviation industry, where there are few accidents and staff reporting is the primary source of data for understanding threats to safety.

Several scholars have indicated that information exchange and learning are part of the central characteristics of what constitutes a good safety culture (Hudson, 2003; Pidgeon and O'Leary, 2000; Reason, 1997; Westrum, 2004). Another important aspect of a good safety culture is that of reason and fairness. According to Reason (1997), a good safety culture is also a just culture, implying that workers accept the rules and feel they are treated fairly if rules are broken or errors are made. This suggests that workers generally understand and accept the rules and procedures implemented because they understand the logic behind the rules. At the same time, a safety culture is also a flexible culture in which individuals are able to learn and adapt to changes in their environments (Reason, 1997). "To utilize safety data there must be flexibility to respond in novel ways to system or environmental perturbations or threats (a 'flexible culture'), and a 'learning culture' is needed to draw appropriate conclusions and implement necessary changes (e.g. to procedures)" (Mearns et al., 2013, p. 124). Thus high reliability organizations (HROs) are, according to Weick (1987), characterized by a culture that encourages interpretation, improvisation, unique action, and a climate of trust and openness between management and workers.

The security regulations put in place in European aviation since the 9/11 attacks in New York are not built on trust or interpretation. Airline pilots cannot carry sharp objects through security despite the fact that they have access to steel axes in the cockpit and could even crash the plane if they wanted to. The security rules are fixed, are absolute, and can seem illogical and unreasonable from the aviation employees' perspectives. Our research results show that the indicated contradictions between approaches can be detrimental to the error-discovery and problem-solving processes of many civil aviation organizations. Dealing with conflicting demands might be particularly challenging for those parts of the aviation networks that are less automated with respect to information systems and, thus, have a higher demand of local knowledge and expertise in order to be reliable and efficient, such as the Norwegian short runway system.

Yet, the operative consequences, possible conflicts, and management of the implementation of new security measures, which has been a major area of development recently, do not seem to have been a major topic of research, perhaps due to the political sensitivity of the topic. Some relevant and interesting studies do exist, such as one study carried out by the Australian Transportation Board looking at the potential side effects for work environment and safety of hardened cockpit doors (Australian Transport

Safety Bureau, 2006). In addition, from an economic perspective researchers have argued that the cost-effectiveness of resources allocated to aviation security is questionable and more lives could possibly be saved by allocating resources to other safety measures (Akhtar et al., 2010; Mueller and Stewart, 2012). In general, however, studies that address the relationship between flight safety and aviation security from an organizational perspective, focusing on issues such as organizational structure, culture, and power, seem to be lacking.

The remaining part of this article is organized as follows. In the next section, we describe some of the organizational foundations for flight safety. Our approach is informed by research on HROs (Weick, 1987; Roberts, 1993; LaPorte, 2006a) and previous research on organizational aspects of safety within civil aviation (Pettersen, 2008). We then explain the characteristics of how aviation security is organized. In order to clarify the difference in organizing principles between flight safety and aviation security, we thereafter present a theoretical framework characterizing the two sets of organizational principles. Based on LaPorte (2006b), we put forward three organizational and structural strategies for critical infrastructure protection as a foundation for discussing the perceptions of security regulations within the airline we have studied and how contradictions can be managed. After this description, we present our empirical research in section six, including a brief description of the context from which our survey results are taken, before the survey results are presented in section seven. Finally, results are discussed in light of the theoretical approach presented, and we end with some concluding remarks.

2. Organizational foundations for flight safety

Aviation safety is founded on the premise of anticipation, learning from failures and experiences in the past. Resources are allocated in specific ways to ensure that the same failures do not happen again. This requires an embedded dedication to flight safety from the organizations responsible for implementation as well as a functional structure with specialized roles following standards and procedures. However, previous research has also shown that the level of flight safety achieved by the aviation industry over recent decades is based on more than a formalization of structure and rigidity of functional practices within organizations (Pettersen, 2008). Studies within among other aircraft maintenance has shown that aviation organizations are managing complex systems and at times have to be flexible in order to learn and cope with uncertainties that arise (Pettersen, 2013). Earlier research has also found similar traits within air traffic management (Roberts, 1993). When required, organizations are capable of shifting between rigid routine-oriented operating modes to problem-solving approaches based on local knowledge. When this happens, rules become flexible and operational experts have the power to control operations and direct communication flows unhindered by standard chains of command with the problem being everyone's focus (LaPorte, 2006a,b; Weick and Sutcliffe, 2001).

In addition to the ability to combine an anticipatory and adaptive (i.e. resilient) mode of operation, civil aviation organizations also demonstrate such robustness over long periods of time. Comparable to what has been found in studies of HROs (Weick and Sutcliffe, 2001; LaPorte, 2006a), aviation organizations have a continuous focus on error discovery and correction which supports them in achieving a sustained robustness. They share management traits where they are reluctant to simplify interpretations of the environment and stay aware of system interactions and the interconnectivity between internal tasks. Social networks for information sharing are developed locally and decentralized to support learning, such as at airports (Pettersen, 2008). Such networks

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