



# Measuring the effects of Safety Management System practices, morality leadership and self-efficacy on pilots' safety behaviors: Safety motivation as a mediator



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## ARTICLE INFO

### Article history:

Received 31 March 2013

Received in revised form 8 August 2013

Accepted 28 September 2013

Available online 18 October 2013

### Keywords:

Pilot safety behavior

Safety motivation

Safety Management System

Morality leadership

Self-efficacy

## ABSTRACT

Pilot safety behavior is viewed as a critical determinant of airline safety performance, and thus it is crucial to identify the factors which may enhance such behaviors. This study adopts an integrated perspective and considers three antecedents of this behavior, including organizational, group and individual factors. Specifically, this research simultaneously examines the effects of pilots' perceptions of Safety Management System (SMS) practices, fleet managers' morality leadership and pilots' self-efficacy on flight crews' safety behaviors through the mediation of safety motivation. Using a sample of 239 commercial pilot participants, and the Structural Equation Modeling (SEM) technique, the results indicate that both perceptions of SMS practices and self-efficacy have direct, positive effects on pilots' safety behaviors, while the effect of fleet managers' morality leadership on such behavior is fully mediated by pilots' safety motivation. The managerial implications for both human resource management and enhanced airline safety are also discussed.

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## 1. Introduction

Safety has always been a critical consideration in air transport, and within the airline industry pilots' safety behaviors are regarded as important determinants of safety performance. Flight crews have been deemed to be responsible for 55% of worldwide hull loss accidents that occurred from 1996 through 2005 (Boeing Airplane Company, 2006). In Taiwan, for instance, the Aviation Safety Council (ASC) reported that personnel were cited as a major cause or factor in 71.9% of accidents between 2001 and 2010, among which pilots accounted for 46.9% of the related causes/factors (Aviation Safety Council, 2011). Since a number of specific pilot behaviors have been implicated as possible causes of many air accidents (Wells, 1997), it is critical to identify the factors that may enhance the performance of these individuals with regard to safety behaviors.

From the perspective of organizational behavior, the antecedents lead to employee behaviors can be categorized into three groups, i.e., organizational, group and individual (Robbins, 2001).

However, previous research on factors affecting safety behaviors has by and large focused separately on either organizational, group or individual factors. For example, organizational safety climate has been suggested as having a fundamental effect on individual safety behaviors (Cooper and Phillips, 2004; Fogarty and Shaw, 2010). The leadership styles adopted by group leaders, on the other hand, also have significant influences on subordinates. For instance, Barling et al. (2002) indicated that safety specific transformational leadership significantly affects occupational safety. As for individual-related factors, personality and attitude have often been related to the unsafe behaviors of pilots (Hunter, 2005; Musson et al., 2004). However, despite the extensive research linking the various antecedents of safety behaviors, few studies have examined organizational, group and individual factors simultaneously, although it is known that people's behaviors stem from a base of personal knowledge and values, as well as from group norms and the prevailing organizational culture (Bill, 2003).

Furthermore, the majority of past studies of safety related behaviors examined general aviation pilots rather than commercial airlines' flight crews (e.g., O'Hare and Smitheram, 1995; Pauley et al., 2008; Wiegmann and Taneja, 2003). To restate the key role played by pilots in the airline industry, it is commonly acknowledged that commercial airlines pilots are directly responsible for the safety of passengers, crew members and airplane operations as a whole. To a high degree, pilots' individual safety behaviors

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thus not only indicate their professional performance, but also directly affect their airlines' safety records. Consequently, the present study attempts to develop an integrated model with three factors (i.e., organization, group, individual), which may directly or indirectly influence commercial pilots' safety behaviors, with a particular focus on pilots who work for Taiwanese international airlines.

With regard to the organizational aspect, the current study used pilots' perceptions of their airlines' Safety Management System (SMS) practices as the main indicator of interest. An SMS is regarded as an explicit element of corporate managerial responsibility, which sets out a company's safety policy and defines how it intends to manage safety as an integral part of its overall business (United Kingdom Civil Aviation Authority, 2002). In recent years, airlines have relied on the use of an SMS to integrate safety policies and augment safety performance at both organizational and individual levels (Chen and Chen, 2011). Pilots' perceptions of their airlines SMS practices can thus be used as an organizational factor to investigate their relationship with pilots' safety behaviors. As for the group indicator, among the various factors that affect employee attitudes and behaviors, a number of studies have proposed that leadership has a powerful effect on employee work behaviors (e.g., Yukl, 2002). Corresponding to the cultural background and specific job characteristics of the targeted research population, the morality leadership performed by fleet managers is used to examine its predictive power with regard to pilots' safety behaviors. Moral leaders are highly respected and admired by employees with Chinese cultural backgrounds, for their demonstrations of integrity and concern with collective interests rather than their own personal benefits (Chen et al., 2011; Niu et al., 2009). Since the present paper examines the flight crew members working for five Taiwanese international airlines, which can be seen as international organizations embedded in Chinese culture, it is believed that this study's examination of whether morality leadership increases pilots' safety behaviors can add to the literature by extending current understandings of this and related topics. Meanwhile, personal attributes have also been identified as having predictive power with regard to pilots' safety behaviors in previous work (Ji et al., 2011). The current paper adopts pilots' perceptions of self-efficacy as the indicator to explore how it affects their own safety behaviors. According to Bandura (1995, p. 2), self-efficacy is "the belief in one's capabilities to organize and execute the courses of action required to manage prospective situations". Research reveals that people with low self-efficacy tend to become unreliable and unpredictable when engaging in a task (Bandura, 1997a,b). Due to the tremendous responsibilities taken on by flight crews, it is expected that pilots with a high sense of self-efficacy may be better able to confront the challenges they meet at work and exert more efforts to improve their abilities. It is thus anticipated that the examination of the causality between pilots' perceived self-efficacy and their safety behaviors that is carried out in this work will improve understanding of the related causal relationships at the individual level.

In addition, pilots' safety motivation is used as the mediating variable between the selected factors and pilots' safety behaviors to further extend the understanding of the related psychological paths. Probst and Brubaker (2001) proposed that safety motivation has a lagged effect on safety behaviors, while Griffin and Neal (2000) argued that safety performance is determined by how motivated individuals are to perform the related behavior. In the current paper, the direct effect that safety motivation has on pilots' safety behaviors, and its mediating effect between the other indicators and these behaviors are analyzed concurrently. The conceptual model shown in Fig. 1 illustrates the mechanisms underlying the interrelationships among these variables, which are discussed in detail in the following sections.

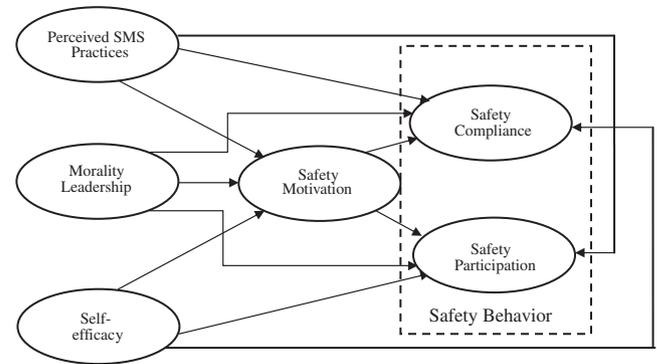


Fig. 1. Conceptual model.

## 2. Conceptual background and hypotheses

### 2.1. Safety motivation and safety behavior

Although there is no universal agreement on the definition of motivation, most psychologists describe it as any internal condition that appears by inference to initiate, activate, or maintain goal-directed behavior (Lefton and Brannon, 2002). Safety motivation thus refers to an individual's willingness to exert efforts to perform safety behaviors and the valence associated with those behaviors (Neal and Griffin, 2006). It can also be perceived as attitudes and perceptions relating to the influences motivating safe or unsafe behaviors (Williamson et al., 1997). As it is documented that motivation will influence behavior in a positive way (Miller, 1988), individuals who are motivated to engage in safety behaviors should be more likely to carry out these behaviors.

Since they are expected to work as flight managers, pilots not only have to practices, monitor and facilitate safety duties on board (Molesworth et al., 2006), but take the initiative to participate in safety related activities and advocate safety concepts both in the air on the ground. A comprehensive definition of safety behaviors as being composed of employee compliance with behavioral safety routines and proactively contributing to safety related work is thus used with regard to pilots' safety behaviors in the current study. This is consistent with the theoretical approach led by Griffin and Neal (2000), which differentiated safety behaviors into two types: safety compliance and safety participation. Safety compliance indicates the fundamental behaviors practiced by the employees to ensure personal and workplace safety, which involves "adhering to safety procedures and carrying out work in a safe manner" (Clarke and Cooper, 2004, p. 90). In contrast, safety participation refers to the behaviors which help develop a safety-supportive environment instead of guaranteeing personal safety. Helping co-workers, promoting safety programs and volunteering for safety activities are all considered as safety participation behaviors. Given the causality between motivation and behaviors, it is presumed that the stronger the safety motivation that pilots have, the more willing they are to practice safety behaviors. Furthermore, this study also hypothesizes that safety motivation mediates the causal relations between the targeted predictors and the two types of pilots' safety behaviors. The hypothetical mediation effects will be illustrated in the subsequent sections. The first hypothesis is presented as follows:

**H<sub>1</sub>.** Pilots' safety motivation is positively associated with their safety compliance and safety participation.

### 2.2. Perceived SMS practices

Pilots' perceptions of their airlines SMS practices are used as the organizational factor in this work. SMS is developed on the

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