

Systematic Literature Review of the Importance of Safety Culture on Aviation Safety Management Systems (SMS)

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Abstract: Safety, and by extension, safety management systems (SMS), are increasingly popular notions and practices in various industries, including aviation. ICAO recommends that every aviation service provider implement an SMS within the appropriate framework and commensurate with the size and complexity of its products. To help the implementation of the SMS successfully, understanding the importance of the safety culture within an organisation support the management in identifying needs and designing an SMS programme more effectively. A detailed and structured literature review was performed and indicated that safety culture was a fundamental for the proper running of organisational operations. Since culture is a concept that people can transfer from time to time to various groups, the best definition is shared values, practices, attitudes, and beliefs that govern how an organisation functions. Thus, the organisation's success partly rests on its ability to emphasise safety issues by ensuring its employees' perceptions. An institution that emphasises and supports a safety culture is likely to minimise the potential risks associated with human mistakes that may result in disasters of greater magnitude.

Index Terms— Safety Management System, Aviation, Safety Culture, SMS

I. INTRODUCTION

The aviation industry is one of the most regulated industries in the world and is subject to many safety regulations and standards. It involves many stakeholders, including airlines, airports, and other aviation-related organizations. Airlines, airports, and other aviation businesses progressively use safety management systems (SMS) to guarantee that safety procedures are maintained and enhanced. SMS is a systematic strategy for controlling safety hazards, including organizational structures, accountability, policies, and procedures. The major goal of SMS is to minimize the number of aviation accidents and incidents.

Safety culture is also an important factor in aviation safety. It is described as an organization's shared values, beliefs, and practices that create a safe and secure environment. A strong safety culture increases personnel's safety awareness, improves safety performance, and improves safety outcomes. This paper will examine the relationship between SMS and the perceived safety culture of aviation personnel. It will begin by discussing the SMS concept and its importance in the aviation industry. It will then go into aviation safety culture and the significance of having a strong safety culture. Lastly, the article will explore the link between SMS adoption and aviation personnel's perceived safety culture.

II. LITERATURE REVIEW

A. *Safety Management Systems Concept*

Safety Management Systems (SMS) are designed to provide an effective safety management system, enabling organizations to systematically identify, assess, and manage hazards and risks in the aviation environment. The International Civil Aviation Organization (ICAO) defines SMS as "a formalized system developed to manage risks in aviation operations systematically" (ICAO, 2016). SMS aims to ensure that safety is integrated into the organization's day-to-day operations and that all personnel is aware of their safety responsibilities. ICAO Annex 19 outlines the requirements for implementing an SMS, which includes identifying safety hazards, developing safety policies and procedures, implementing safety management processes, and monitoring and evaluating safety performance. Similarly, ICAO defines safety management as "the systematic application of management principles and practices to achieve safety objectives" (ICAO, 2016). SMS is, therefore, a complete and systematic approach to safety management. It comprises the organizational structures, accountability, policies, and processes for dealing with safety concerns. The primary goal of SMS is to incorporate safety into all elements of aviation operations, including risk management, policy creation, and execution of safety management processes (Adjekum & Tous 2020). Furthermore, SMS encourages the development of a safety culture within the aviation community, which is critical to the continuing safety of aviation operations.

SMS strives to minimize the number of aircraft accidents

and mishaps. It is founded on the risk management principle, which entails identifying possible hazards, analyzing the risks connected with them, adopting risk-reduction measures, monitoring the efficacy of the measures, and taking corrective action when required (Kin, 2015). SMS helps identify potential risks and implement measures to reduce the likelihood of an accident or incident (İnan & Bückeç 2020).

B. Safety Culture in Aviation

Safety culture is an important element of aviation safety management and can be defined as the degree to which safety is valued and prioritized within an organization. It is based on the personnel's attitudes, values, and beliefs and is manifested in the behaviors and actions of the personnel. The importance of a safety culture in efficiently using SMS has been emphasized. The personnel must be aware of the safety risks and willing to take the necessary actions to manage them. A strong safety culture is one in which safety is a priority for everyone in the organization, from the senior management to the frontline staff. It is also one in which safety is seen as a core value rather than something that is “done” or “enforced.”

Safety culture has been shown to have a direct impact on safety performance. It has been found that organizations with a strong safety culture have fewer accidents and incidents and that safety is more likely to be taken seriously by personnel (Kin, 2015). A strong safety culture encourages personnel to report incidents and hazards and to take proactive measures to prevent accidents and incidents. Safety culture is affected by several factors, such as organizational culture, leadership, safety climate, and safety policies and procedures. Organizational culture refers to the values and beliefs of an organization, which can influence the attitudes and behaviors of personnel. Leadership is also important in developing a safety culture, as it can set the tone for the organization and provide guidance and support to personnel (Adjekum et al., 2016). Safety climate refers to the perceptions and beliefs of personnel regarding safety in the organization, and safety policies and procedures are essential for successfully implementing a safety management system.

III. RELATIONSHIP BETWEEN SMS IMPLEMENTATION AND SAFETY CULTURE

Safety culture plays an important role in the effective implementation of SMS, and the relationship between SMS implementation and the perceived safety culture among aviation personnel has been studied extensively. Research has shown that implementing an SMS is associated with greater safety awareness among personnel and a stronger commitment to safety (ICAO, 2016). The research has also shown that implementing an SMS is associated with an improved perception of safety culture among the personnel. The personnel are more aware of the safety risks and are more willing to take the necessary actions to manage them

(Robertson, 2017). Employees aware of the safety risks and the procedures for managing them are more likely to take proactive steps to reduce the risk of accidents and incidents. It has been found that personnel in organizations with SMS are more likely to report incidents and hazards and that they are more likely to take proactive measures to prevent accidents and incidents (Kin, 2015). In addition, research has shown that personnel in organizations with SMS are more likely to perceive the organization as having a strong safety culture. This is because SMS helps organizations identify and manage safety risks and create a culture of safety shared by all personnel. Employees aware of the safety management processes and procedures are likelier to have a positive attitude toward safety. They are more likely to take personal responsibility for safety, and this can lead to improved safety performance.

However, the effectiveness of SMS implementation is also dependent on the quality of safety policies and procedures and the commitment of personnel to the safety process. If the policies and procedures are inadequate or not properly implemented, the perception of safety culture among personnel may be negative (Robertson, 2017). Additionally, the SMS may be ineffective if the personnel is not committed to the safety process.

IV. DISCUSSION

The aviation sector is complicated and dynamic, and it must always adhere to safety norms and requirements. Safety Management Systems (SMS) has become essential to aviation safety management. They ensure that the aviation industry complies with safety regulations and standards and that safety management practices are effectively implemented and maintained (ICAO, 2016). Implementing SMS is associated with greater safety awareness among the personnel and a stronger commitment to safety. It is associated with an improved perception of safety culture among the personnel (Adjekum et al., 2016). Research has shown that personnel with SMS are more likely to perceive the organization as having a strong safety culture and are more likely to take proactive measures to prevent accidents and incidents (Stroeve & Kirwan 2022).

Implementing an SMS benefits the organization, enabling it to systematically identify, assess, and manage safety risks. It also provides a framework for developing safety policies and procedures and monitoring and evaluating safety performance (Robertson, 2017). Moreover, deploying an SMS benefits staff by improving their knowledge of safety concerns and readiness to take the required steps to control them. It also contributes to developing a common safety culture among all workers and ensures that safety is taken seriously by everyone in the company. SMS encourages personnel to take ownership of their safety responsibilities and proactively identify and manage safety risks. Furthermore, it allows organizations to demonstrate commitment to safety and to track and manage safety performance.

The perception of safety culture among aviation personnel is closely related to implementing SMS. Employees aware

of the safety management processes and procedures are likelier to have a positive attitude toward safety (Robertson, 2017). Implementing SMS can increase safety awareness among the personnel, leading to improved safety performance.

V. CONCLUSION

Safety management systems (SMS) have become essential to aviation safety management. They ensure that the aviation industry complies with safety regulations and standards and that safety management practices are effectively implemented and maintained. Implementing an SMS is associated with greater safety awareness among the personnel and a stronger commitment to safety. It is associated with an improved perception of safety culture among the personnel. Implementing an SMS benefits the organization, enabling it to systematically identify, assess, and manage safety risks. For the personnel, it increases their awareness of the safety risks and willingness to take the necessary actions to manage them. Research has shown that implementing an effective SMS can positively impact the perceived safety culture among aviation personnel and lead to increased safety performance. Additionally, implementing an effective SMS can lead to improved communication and collaboration between personnel, which can help reduce errors and improve safety performance (Çokorilo Dell'Acqua 2013). Finally, SMS implementation can help reduce the costs associated with safety incidents, leading to increased efficiency and productivity.

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