
A Study on Applying the Safety Management System To Risk Management

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Abstract

The implementation of risk management is critical to the success of business management. The ultimate goal of risk management is to eliminate risks, optimize the safety management system structure, perform standard operating procedures exactly, and adopt the Target–Procedure–Do–Check–Act management method. This study proposed to provide solid training as a basis, employ sophisticated management skills, incorporate safety cultural management, eliminate risks, and achieve the goals of the safety management system.

Keywords: risk management, safety management system (SMS), standard operating procedures (SOP), target–procedure–do–check–act (TPDCA)

1. Introduction

This study intends to eliminate traffic accidents and pave a completely safe way home. On December 21, 2018, shortly after the derailment of Puyuma Express at Xinma Station on October 21, the Director of Taiwan Railways Administration (TRA), Chang Chen-yuan soon established an operational safety sector to ensure traffic safety. Moreover, he introduced the safety management system proposed by the International Civil Aviation Organization (ICAO). Under the basic management structure, this study believes that safety management should start from three relevant elements: people, events, and things. The first step is to establish a sound and complete safety management structure and implement the safety management system. After receiving solid training courses, all stakeholders can take good advantage of their expertise based on their professional characteristics. In addition, they are encouraged to devote themselves to adopting a safety management system, embracing the safety culture, attaining the goal of safety management, and further eliminating the risks of traffic accidents.

1.1 Research Background and Motivation

Life is priceless, and railway safety management is critical to people's lives. Therefore, railway safety is the primary goal of railway company operations (Suen et al., 2016). After the Puyuma accident at Xinma Station on October 21, 2018, Taiwan Railways Administration (TRA) actively promoted a series of measures to improve railway safety management (Lin, 2021). The railway safety management system has been in operation for more than two years since December 2018. Nonetheless, this safety system could not prevent railway accidents as the Taroko Express train derailment accident (which killed 49 people and injured at least 200 others) still occurred in Hualien on 2 April, 2021. The reason is that the operation of the safety management system has stepped into the so-called "minefield". This means that accidents happen for a reason. In general,

the current railway safety management system focuses too much on the attribution of accident responsibility (rather than on the root cause of the accidents) to prevent these tragedies from happening again. Likewise, aviation safety management is also closely related to people's lives. Two major flight accidents at home and abroad (such as TransAsia Airways Flight GE235 accident on February 4, 2016, and Trigana Air Flight 267 air crash on August 16, 2015) also demonstrate the importance of safety management systems to identify the root causes in order to eliminate accidents.

1.2 Research Purpose

As indicated by Ouedraogo (2016), railway safety management is a significant issue in the field of railway operation systems. Until now, railway safety management remains a pivotal element for railway management. After exploring the reasons for the Puyuma train accident at Xinma Station on October 21, 2018 and the Taroko Express train derailment accident in Hualien on 2 April, 2021, this research discovered that relevant safety management measures were not sound enough and there were several loopholes that may lead to accidents. Therefore, this research proposed an optimized safety management structure. It is hoped that this safety management structure can be fully implemented to eliminate hidden dangers of accidents.

1.3 Research Structure

The research structure of this study is presented in Figure 1 (as shown below):

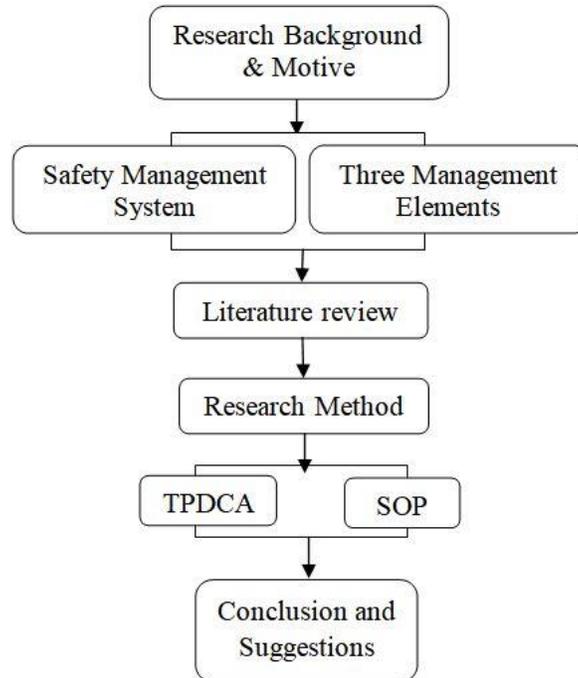


Figure 1. The research structure of this study

This study discussed safety management systems from three aspects (as shown in Figure 2), including equipment safety, operational safety, and behavioral safety.

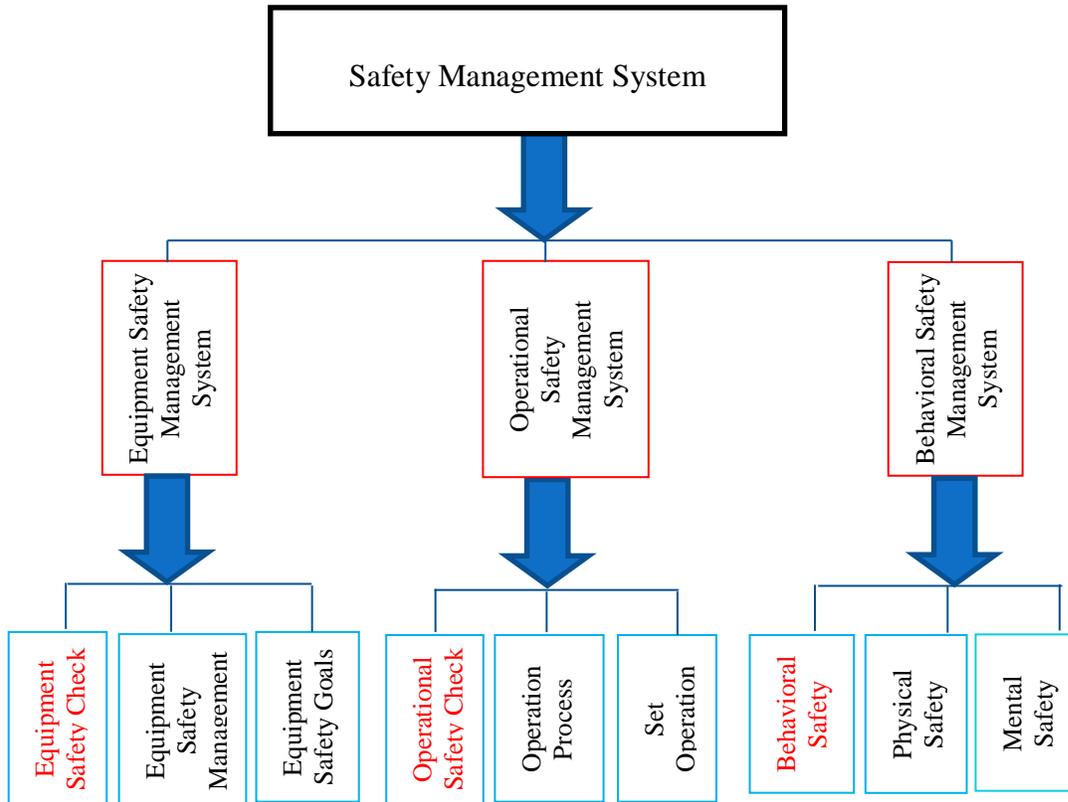


Figure 2. The management operation structure of this study

Equipment safety management system: Develop equipment safety design plans, formulate safety maintenance goals, and strictly implement audit management in order to prevent risks and ensure safety.

Operational safety management system: Establish goals for specific operational behaviors, formulate standard operation processes to ensure operational safety, and exercise operational safety checks on operational records to eliminate risks.

Behavioral safety management system: This human-based management system focuses on mental state, physical health, and behavioral assessment.

As presented in Figure 3, this study added an additional element (ie. target setting) to the traditional procedure-do-check-act (PDCA) management method to improve the performance of the safety management system.

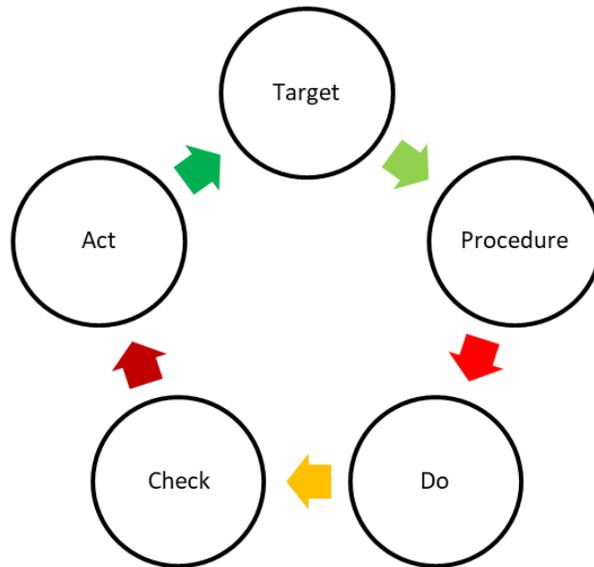


Figure 3. The workflow of this study

The fundamental basis of safety management systems relies on strict compliance with standard operating procedures (SOP), which is the guarantee of operation safety. Adhering to SOP, coupled with solid training and brilliant management art, will make it easier to attain management goals and prevent accidents caused by negligence.

Safety goals can only be achieved by implementing and managing SOPs through a rigorous audit process. A railroad company must improve all phenomena that violate its safety goals to reach its safety goals.

1.4 Literature Review

As indicated by Chang et al. (2017), there are three basic factors for designing a "sponge city", including vegetation, soil, and pervious design. Similarly, Yu (2021) claimed that a strategy has three elements (goals, methods, and actions). This study also put forward a safety management approach with ternary dimensions: people, events, and things. Among all these elements, "people" are the key to safety management measures, and the control behaviors of "events" and "things" become the cornerstone of safety inspection management (as shown in Figure 2). This study aimed to understand and control the safety risks of railway operations, and further eliminate any potential accidents. Even with ICAO's efforts to develop a complete safety management system, aviation accidents still occur from time to time. Sakrutina (2017) suggested that traffic safety systems should focus on monitoring safety threat systems to reduce risks and minimize accident losses. Bao et al. (2019) stated that management is the best way to drive operational efficiency and reduce risks. Bashatah & Sherry (2021) claimed that adopting standard operating procedures can ensure safety and improve operational efficiency. Establishing and implementing standard operating procedures is critical to risk reduction. According to Xue & Fu (2018), it is recommended to reduce accident rates by optimizing management methods. Regarding complicated safety systems, For complex safety systems, Bugalia & Ozawa (2021)

stated the relationship between elements should be considered. That is why this study adopted the ternary theory for safety checks. Moreover, this study proposed a TPDCA management method to perform standard operating procedures (shown in Figure 3) with the goal of eliminating risks.

2. Method

For organizational operations, the positive value of management is to increase productivity and minimize losses. In terms of risk management, this study established a comprehensive safety management system based on a ternary theory in managerial philosophy and categorized the root causes of accidents into three management aspects: including people, events, and things, as shown in Figure 2. In this figure, the standard operating procedures are established according to the different features of the three management elements. In this way, the TPDCA theory in this study can be employed and the risks can be reduced. The so-called TPDCA is to establish goals based on different characteristics, and then use these characteristics as the basis for the formulation of SOP. Finally, the goal will be achieved after reviewing and improving the deficiencies. In short, only when the proposed and theory-based safety management system can be put into practice, can we create safe ride experiences for the public and achieve the goal of eliminating risks.

3. Results and Discussion

Risk management plays a significant role in the success of business operations, so this study aims to investigate the soundness of safety management systems. The safety management system can promote the strict implementation of SOPs and ensure further safety. However, the main body that performs the operation of the safety management system is the "staff". Therefore, this study suggests that organizations should be cautious when managing "staff" and provide a complete education to cultivate good character and arouse their humanistic consciousness. The study adopted scientific management methods to analyze, evaluate and manage safety operations so as to establish a safety-oriented business culture and adopt safety management systems. The implementation of the safety management system is the joint responsibility of all the members of organizations, and its performance effectiveness is the key to the success of the organization. Therefore, the study suggests that organizations educate employees, integrate safety culture into each employee's work and life, create an atmosphere of safety culture, encourage all employees to commit to the implementation of the safety management system, and take full advantage of this system to prevent traffic accidents.

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