

The Influence Of The Safety Management System (Sms) And The Role Of Organizations On Aviation Safety Through Safety Culture At XYZ Airport

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Abstract: This research is motivated by increased incidents in 2023 compared to 2022, an occurrence from the Airport Safety Performance Indicators where the highest criteria for incidents in 2019 - 2023 are Bird Strikes (bird attacks) with 3 (three) incidents. This research aims to determine the influence of the Safety Management System (SMS) and the role of organizations on aviation safety through the safety culture at XYZ Airport. The research method is quantitative. The sample used was 250 respondents who were PT Angkasa Pura II employees at XYZ Airport. The sampling technique uses a simple random sampling technique. The data collection technique is a questionnaire. The data analysis technique uses Structural Equation Modeling (SEM) based on Smart PLS 2024. The research results show that safety culture can be influenced by the implementation of the safety management system and the role of the organization, aviation safety is not influenced by the role of the organization but is influenced by the implementation of the safety management system and safety culture, the implementation of the safety management system does not affect aviation safety through safety culture, and the role of the organization can influence aviation safety through safety culture. Researchers hope that companies will continue to carry out evaluations and innovations to improve security system management.

Keywords: Safety Management System (SMS), Role Of Organizations, Safety Culture, Aviation Safety.

INTRODUCTION

One means of transportation that has high safety standards is air transportation. The International Civil Aviation Organization (ICAO) is the body responsible for setting civil aviation safety standards throughout the world (Susanto & Keke, 2020). ICAO is part of the United Nations (UN) and is tasked with compiling international civil aviation regulations, distributing them, as well as monitoring and evaluating their implementation. ICAO implemented the Chicago Convention in 1944 which established compliance standards shown

to all ICAO members to ensure international aviation safety with the issuance of Annex 19 which discussed the Safety Management System. As a UN member country, Indonesia has been a participant in the ICAO convention since April 27 1950 with Adhere or submissive status. As a member country of ICAO, airports in Indonesia are required to meet aviation safety standards. According to ICAO Annex 19 concerning Safety Management Systems, airports that are ICAO member countries must create and implement an Aviation Safety Program (Safety Management System/ SMS) that is adapted to the structure and complexity of the aviation system at the airport. This is done to regulate the aviation safety system at each airport. Apart from implementing an organizational structure, airport managers are also required to implement Safety Culture to improve flight safety.

SMS is required in airport management in accordance with Minister of Transportation Regulation Number PM 62 of 2017 concerning Safety Management Systems. SMS focuses on a systematic approach to identifying and mitigating aviation safety risks to reduce the loss of human life, damage to aviation property, including organizational structures to maintain an acceptable level of safety (ALoS). SMS Airport operations are one means of maintaining civil aviation safety through compliance with aviation safety regulations and standards (Fiyanzar et al., 2016). A Safety Management System (SMS) is needed for an aviation organization to identify potential hazards by managing aviation safety risks faced in flight operations (Majid et al., 2022). SMS includes key elements that are essential for identifying safety hazards, ensuring the implementation of corrective actions necessary to maintain safety performance, providing for continuous monitoring and routine assessment of safety performance as well as continuous improvement of the overall performance of the safety management system (Majid et al., 2022). Aviation safety is a condition where safety requirements are met in the use of airspace, aircraft, airports, air transportation, flight navigation, as well as supporting facilities and other public facilities (UU No. 1, 2009). However, in reality, there are still many obstacles to fulfilling safety in the use of airspace, aircraft, airports, air transportation, flight navigation, and other facilities (Susanto et al., 2020).

Aviation safety is the responsibility of all elements involved in aviation. The government as a regulator is obliged to make regulations and government programs that can guarantee and improve aviation safety. The government is also obliged to create a monitoring program to ensure that the implementation of regulations is carried out properly (Susanto et al., 2021). PT Angkasa Pura II runs a Safety Management System to improve and ensure that all aspects of providing aviation services are properly managed (Peniarsih, 2015). Continuous growth of air traffic and the development of aviation systems, the current safety management methodology must be improved and improved. Safety Management Systems (SMS) help aviation organizations to manage, maintain, and improve safety efficiently. Safety management also includes identifying events or incidents that occur. According to (Majid et al., 2022) states that ignoring incidents can result in more serious accidents. In managing safety risks, there is a hazard identification process to prevent incidents from occurring. One source of hazard identification is hazard reporting. With systemized hazard reporting, potential hazards can be reduced. Number of hazard reports at XYZ Airport. Hazard reporting from 2021 to 2023 will not increase. Law Number 1 of 2009 concerning aviation Article 318 states that aviation safety culture needs to be built in the form of a reporting culture, an informed culture, a learning culture and a Just Culture. Just Culture is a condition of trust in the community that is encouraged and even rewarded for conveying information related to safety and clearly understanding the boundaries of acceptable and unacceptable behavior. In the Regulation of the Directorate General of Civil Aviation Number SKEP 223 of 2009 concerning instructions on procedures for implementing a safety management system (Safety management system) for Airport Operations, Section 139-01, Hazard is a potential condition that can cause injury, illness or death to people, damage or loss of systems, equipment, property, environment or company image. Hazard reporting is needed to identify early so that incidents/accidents do not occur. Based on the Regulation of the Director General of Transportation Number KP 622 of 2015, hazard identification is a continuous process and involves all key personnel and appropriate stakeholders so that if measured, the percentage of the number of reports to the number of employees at PT Angkasa Pura II XYZ Airport is around 20%. Based on Online Safety Reporting System (OSRS) SMS Hazard Report data in 2019-2023, the number of hazard reports related to Infrastructure Damage & marking/signage was widely reported as the highest hazard in 2019-2023.

A condition for realizing a flight that is carried out safely and securely under the flight plan is flight security and safety. Safety is the main priority in the world of aviation, there is no tolerance for errors, no matter how small. As said by the Head of the First Class Region I Airport Authority, Yufridon Gandoz, aviation safety must be carried out with the right actions, not just words or theories. As the airport manager, PT Angkasa Pura II prioritizes aviation safety so that safety is the main priority. PT Angkasa Pura II has challenges in managing aviation safety due to the increase in aircraft movements and passenger movements (Natha & Haryati, 2023). To realize aviation safety, the government has issued various regulations such as Law Number 1 of 2009 concerning Aviation, Minister of Transportation Regulation Number PM 62 of 2017 concerning Safety Management Systems, and Regulation of the Director General of Civil Aviation Number SKEP 223 of 2009 concerning Technical Instructions for Regulations Civil Aviation Safety Section 139-01. However, these regulations are not enough to guarantee the implementation of efforts to create aviation safety if they are not accompanied by the awareness and safety culture of the relevant parties. Meanwhile, to build a safety culture, three dominant factors drive safety culture in an organization, namely individuals, technology, and organizations (ITO) (Prasuad et al., 2016). Organizations play an important role in implementing a safety management system, one of which is related to fulfilling safety resources, both human resources and other resources. The allocation of human resources for safety management at XYZ Airport is not yet optimal, this is because there are vacancies in managerial positions for the safety function at XYZ Airport from 2020 to 2024. PT Angkasa Pura II as the airport certificate holder should implement the Safety Management system. In carrying out its role, PT Angkasa Pura II makes efforts to improve safety, one of which is building a safety culture and providing resources to improve safety on an ongoing basis. Providing safety resources includes filling job formations and increasing employee competency through safety training programs. On research Prasuad et al., 2016), that to support the optimization of the organization's role in safety culture, it is necessary to measure safety climate in sub-organizations so that individual views on the role of the organization can be known. By strengthening weak dominant factors, the role of the organization which is supported by all members of the organization will have a positive impact on strengthening safety culture. A condition for realizing a flight that is carried out safely and securely in accordance with the flight plan is flight security and safety. Safety is the main priority in the world of aviation, there is no tolerance for errors, no matter how small. As said by the Head of the First Class Region I Airport Authority, Yufridon Gandoz, aviation safety must be carried out with the right actions, not just words or theories. As the airport manager, PT Angkasa Pura II prioritizes aviation safety so that safety is the main priority. PT Angkasa Pura II has challenges in managing flight safety due to the increase in aircraft movements and passenger movements (Natha & Harvati, 2023).

PT Angkasa Pura II as the airport certificate holder must implement the Safety Management system. In carrying out its role, PT Angkasa Pura II makes efforts to improve safety, one of which is building a safety culture and providing resources to improve safety on an ongoing basis. Providing safety resources includes filling job formations and increasing employee competency through safety training programs. In research Prasuad et al (Prasuad et al., 2016), that to support the optimization of the organization's role in safety culture, it is

necessary to measure the research safety climate in sub-organizations so that individual views on the role of the organization can be known. By strengthening weak dominant factors, the role of the organization which is supported by all members of the organization will have a positive impact on strengthening safety culture.

METHOD

A quantitative research design is a systematic approach used to collect and analyze numerical data to test hypotheses or answer research questions objectively. This type of research typically employs methods such as surveys, experiments, or statistical analysis to measure variables and relationships between them. In this design, researchers select a representative sample using appropriate sampling techniques and utilize valid and reliable research instruments, such as questionnaires or specific measurement tools. The results of quantitative research are interpreted through statistical data analysis, providing insights into patterns, relationships, or significant differences between variables, ultimately leading to conclusions based on empirical evidence, in line the previous research (Susanto, Arini, Yuntina, et al., 2024);(Susanto, Arini, Marlita, et al., 2024).

In quantitative research using questionnaires, the time and place of research has the advantage of greater flexibility compared to other quantitative research. This is due to the ability to ask respondents for their opinions in various locations, such as the work environment, home, or public places such as shopping centers or parks. This capability provides many advantages for researchers to obtain data from respondents in the environment most comfortable for them. In this study, the research location was XYZ k Airport with the research time being 2024.

Population is an area that generally consists of objects or subjects that have certain characteristics and qualities that are determined by researchers to be studied and then used to make conclusions (Kurniawan, 2019). The aim of population studies is to provide a deeper understanding of population dynamics, their causes and consequences, and to assist in the development of policies and programs to address various population issues. The population in this research is 250 employees of PT Angkasa Pura II at XYZ Airport.

The sampling technique, according to Sugiyono (Sugiyono, 2017):"The sample is part of the number and characteristics possessed by the population". Researchers in this study used a simple random sampling technique, meaning it was done by giving the population an equal opportunity to be selected as the research sample. In determining the sample size, researchers used the equation formulated by Slovin in Arikunto (2021) that is :

$$n = \frac{N}{1 + Ne^2}$$

Information :

n : Number of samples searched

N: Number of population

e : Tolerable margin of error.

By using this formula, the following calculations are obtained: Based on the formula calculation above using a tolerable margin of error of 5%, the sample for this study was 154 people.

Method of collecting data Primary Data

Primary data collection uses a questionnaire. A questionnaire is an information gathering technique that allows analysts to study the attitudes, beliefs, behavior and

characteristics of respondents. In this case, the questionnaire was given to employees of PT Angkasa Pura II XYZ Airport.

To measure respondents' opinions in this study, a Likert scale was used. According to Sugiyono (Sugiyono, 2017): "The Likert scale is a scale used to measure the attitudes, opinions and perceptions of a person or group of people about social phenomena." The Likert scale answer form consists of: Strongly Agree (SS) = 5, Agree (S) = 4, Disagree (KS) = 3, Disagree (TS) = 2, Strongly Disagree (STS) = 1.

According to Sugiyono (Sugiyono, 2017): "Secondary data is primary data that has been further processed and presented either by the primary data collector or by another party, for example in the form of tables or diagrams." The secondary data in this research are documents relating to safety data at XYZ Airport.

RESULTS AND DISCUSSION

Results

This research uses SEM (Structural Equation Model) with the Smart PLS 3.3 software program. Hypothesis testing was carried out to test whether the independent variable, namely the safety management system and the role of the organization, had an effect on the dependent variable, namely aviation safety, either directly or through the mediating variable, namely safety culture. Output results from hypothesis testing using Smart PLS 3.3 software. in the form of a path diagram can be seen in Figure 1 below.



Figure 1 Source: Smart PLS Data Processing Results (2024)

Based on the results of data processing with Smart PLS version 3.3 software as shown in the bootstrapping output in Figure 1 previously, the next step was to test the hypothesis and the results of the hypothesis test can be seen in table 4.5 below.

Table 1 Hypothesis Test Results of Direct and Indirect Effects				
Influence between variables	T Statistic	P Value	Result	
Implementing a safety management system can influence safety culture	3.136	0.002	H1 accepted	
The role of the organization can influence safety culture	17.576	0.000	H2 accepted	
The implementation of a safety management system can affect flight safety	2.908	0.004	H3 accepted	

Table 1 Hypothesis Test Results of Direct and Indirect Effects

The role of organizations can influence aviation safety	5.169	0.000	H4 accepted
Safety culture can influence flight safety	5.267	0.000	H5 accepted
The implementation of a safety management system can influence aviation safety through a safety culture	4.984	0.000	H6 accepted
The role of the organization can influence aviation safety through safety culture	2.765	0.006	H7 accepted

Source: Smart PLS Data Processing Results (2024)

H₁: Implementing a safety management system can influence safety culture.

The results of the hypothesis test shown in Table 1 show that the implementation of a safety management system can influence safety culture or the hypothesis is supported because the significance value of p-value is <0.05, which is 0.002 and the t statistic is > 1.96, which is 3.136.

H2: The role of the organization can influence safety culture

The results of the hypothesis test shown in Table 1 show that the role of the organization can influence safety culture or the hypothesis is supported because the significance value of p-value is <0.05, which is 0.000 and the t statistic is > 1.96, which is 17,567.

H3: Implementation of a safety management system can influence flight safety

The results of the hypothesis test shown in Table 1 show that the implementation of a safety management system can affect flight safety or the hypothesis is supported because the significance value of the p-value is <0.05, which is 0.004 and the t statistic is > 1.96, which is 2.908.

H4: The role of the organization can influence aviation safety

The results of the hypothesis test shown in Table 1 show that the role of the organization can influence aviation safety or the hypothesis is supported because the significance value of p-value is <0.05, which is 0.000 and the t statistic is > 1.96, which is 5,169.

H5: Safety culture can influence flight safety

The results of the hypothesis test shown in Table 1 show that safety culture can influence flight safety or the hypothesis is supported because the significance value of p-value is <0.05, which is 0.000 and the t statistic is > 1.96, which is 5,267.

H6: Implementation of a safety management system can influence aviation safety through a safety culture

The results of the hypothesis test shown in Table 1 show that the implementation of a safety management system can influence aviation safety through safety culture or the hypothesis is supported because the p-value is <0.05, which is 0.000 and the t statistic is > 1.96, which is 4,984.

H7: The role of the organization can influence aviation safety through safety culture

The results of the hypothesis test shown in Table 1 show that the role of the organization can influence aviation safety through safety culture or the hypothesis is supported because the significance value of p-value is <0.05, which is 0.006 and the t statistic is > 1.96, which is 2.765.

Discussion

Implementing a safety management system can influence safety culture

Based on the hypothesis test that has been carried out by researchers, it is known that the implementation of a safety management system can influence safety culture or the hypothesis is supported because the significance value of the p-value is <0.05, which is 0.002 and the t statistic is > 1.96, which is 3.136. The results of this hypothesis test are in line with previous research regarding safety management systems conducted by Tong et al (2020) which shows that the safety management system can influence safety culture. Safety Management System according to ICAO is a systematic approach to managing safety including the required organizational structure, accountability, policies and procedures. In efforts to implement a safety management system through several stages, a condition is needed where all elements in the organization understand, understand and care about safety itself.

According to (Tong et al., 2020) A safety management system is defined as a collection of arrangements, planning and review as well as program elements that are useful for improving work safety. A safety management system is an integrated mechanism to control risks, which can have an impact on the health and safety of workers, as well as to ensure compliance with statutory regulations.

The role of the organization can influence safety culture

Based on the hypothesis test that has been carried out by researchers, it is known that the role of the organization can influence safety culture because the significance value of pvalue is <0.05, which is 0.000 and the t statistic is > 1.96, which is 17,567. The results of this hypothesis test are in line with previous research conducted by Bustelo et al (2021) who found that the role of the organization, namely the company, can influence the safety culture of employees and companies. According to (Prasuad et al., 2016), Organizational culture refers to the values, norms, beliefs, and practices that govern how an organization operates in managing safety. In any organization involved in the provision of services, production/profitability, and safety risks are interrelated. An organization must maintain profitability to stay in business by balancing output with acceptable safety risks. Organizational support for improving safety culture is needed because organizations have the authority and policies to develop a Safety Culture. (Prasuad et al., 2016), stated that to support the optimization of the organization's role in safety culture, it is necessary to measure safety climate in sub-organizations so that individual views on the role of the organization can be known.

The implementation of a safety management system can affect flight safety

Based on the hypothesis test that has been carried out by researchers, it is known that the implementation of a safety management system can influence flight safety because the significance value of p-value is <0.05, which is 0.004 and the t statistic is > 1.96, which is 2.908. The results of this hypothesis test are in line with the results of previous research conducted by (Fiyanzar et al., 2016) that the implementation of a safety management system has a direct and significant effect on aviation safety. The implementation of the Safety Management system is regulated in the Republic of Indonesia Law, Ministry of Transportation Regulations and other regulations. The issuance of regulations related to safety management is intended to ensure flight safety.

The role of organizations can influence aviation safety

Based on the hypothesis test that has been carried out by researchers, it is known that the role of the organization can influence aviation safety because the significance value of p value is <0.05, which is 0.000 and the t statistic is > 1.96, which is 5,169. The results of this research are in line with this opinion Mezentseva et al (2023) in his research, he said that the concept of organizing underscores an organization's approach to managing and understanding

potential safety risks. This indicates that organizations have an important role in estimating risks that occur unexpectedly. Mindfulness of the organization is also one part that is proven to predict safety performance. Based on ICAO DOC 9859, organizations, in this case Airport Management, have an important role in ensuring aviation safety. According to Gunaryadi, et al (2016) Organizations in the world of aviation emphasize proactive (risk mitigation) and reactive (accident investigation) aviation safety management to strengthen technical factors and human resource errors. The involvement of organizations or management in the world of aviation will mean that aviation safety is very important.

Safety culture can influence flight safety

Based on the hypothesis test that has been carried out by researchers, it is known that safety culture can influence flight safety because the significance value of p value is <0.05, which is 0.000 and the t statistic is > 1.96, which is 5,267. The results of this research are in line with previous research conducted by Ni et al (2022) It was found that safety culture can influence safety-related behavior. Flight operational activities at airports are very complex. Various agencies and personnel are involved in flight operations, including airport personnel, airline personnel, air traffic services and ground handling who participate in flight operational activities. Due to the complexity of aviation operational activities, it is necessary to have a safety culture to ensure aviation safety in accordance with what is stated in Law Number 1 of 2009 concerning Aviation, Article 318, that the government and other stakeholders are responsible for building and realizing an aviation safety culture, (Prasuad et al., 2016) stated that safety culture is implemented as a form of seriousness in improving aviation safety.

The implementation of a safety management system can influence aviation safety through safety culture

Based on the hypothesis test that has been carried out by researchers, it is known that the implementation of a safety management system can influence aviation safety through safety culture because the significance value of p-value is <0.05, which is 0.000 and the t statistic is > 1.96, which is 4,984. The results of this research are in line with the results of previous research conducted by Foster (2023) *Safety Management System* (SMS) influence on Safety Culture which can produce aviation safety. This study uses previously validated tools to measure the strength of the relationship between two SMS initiative factors, namely SMS Policy Implementation and SMS Process Engagement, and safety behavioral components (safety participation, safety compliance, and safety reporting) in several American college aviation programs Union. Meanwhile, according to Yeun (2014) has established the need for SMS to be an important part of improving safety for a dynamic and safety-critical industry such as aviation.

The role of the organization can influence aviation safety through safety culture

Based on the hypothesis test that has been carried out by researchers, it is known that the role of the organization can influence aviation safety through safety culture because the significance value of p-value is <0.05, which is 0.006 and the t statistic is > 1.96, which is 2.765. The results of this hypothesis test are in line with the opinion expressed by Purba (2017), that safety culture is something that is obtained through a combination process between organizational culture, professional culture and also national culture. One effort to implement aviation safety culture is to introduce this culture to stakeholders in aviation activities, by providing education in the form of education and training, where all agency workers engaged in aviation activities are given training so that they have knowledge in implementing safety culture. This is so that later you can understand and know well what aviation safety culture is and how to implement it. Furthermore, according to (Majid et al., 2022) states that if you want to improve aviation safety, organizations need to evaluate and develop a Safety Management System (SMS) on an ongoing basis, by paying attention to the Safety Management System (SMS) aspect which consists of management commitment and responsibility, monitoring performance and continuous improvement of implementation results.

CONCLUSION

Based on the results of research conducted as a measure of the implementation of safety management and the role of organizations in safety through safety culture, it was concluded that the safety management system, the role of organizations and safety culture influence aviation safety. Apart from that, the implementation of a safety management system and the role of organizations influence aviation safety through safety culture. The organizational role variable is the most significant influence on safety culture, while the safety culture variable is the dominant variable influencing aviation safety. Indicators that have a low value for each indicator are.

Recommendation

- 1. Future research that conducts research on aviation safety is expected to be able to conduct research on aviation safety with other variables than previous research.
- 2. It is hoped that further research can be conducted research at several airports so that the research results are more homogeneous and with a larger number of samples so that they can represent the research population as a whole.

Policy Implications

Based on the research results and conclusions described previously, several policy implications for companies include:

- 1. In the future, monitoring will be carried out every quarter to determine safety performance and discuss safety issues so that risk control can be carried out in a measurable manner and increase safety levels.
- 2. The company provides a web-based system/application that makes it easier for employees to access the safety information needed by employees.
- 3. It is hoped that the rewards and punishment given will be adjusted to the violations committed by the employee concerned. Rewards are given in the form of appreciation certificates and/or can be in the form of materials to personnel/units who implement safety, such as implementing a culture of reporting sources of danger or implementing a safety culture. Meanwhile, punishment is given to personnel/units who commit violations under applicable procedures in the Company.
- 4. Innovation is carried out with artificial intelligence (AI) based systems/applications that can inform the condition of equipment that requires maintenance so that the facility selection program can run well and be on target.

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