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Analysis of Emotional Intelligence, Airmanship, and Situational Awareness Resilience to Indonesian Pilot Emergency Decision Making

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ABSTRACT

Aircraft is a mean of transportation with the highest level of safety among other means of transportation, this is inseparable from improvements in the operating system, maintenance and improvement of rules in aviation safety and security. Among the causes of the plane crash, based on the recorded data, the HR factor or Human Error is the highest causal factor, and this cannot be separated from the Pilot's Decision Making in a flight. This study examines 3 aspects that must be considered by regulators and flight operators, including 1. Emotional Intelligence of an Aviator, 2. Airmanship and 3. Situational Awareness Resilience of a Pilot who has limitations on Emergency Decision Making Strategies. Sampling in this study used a random sampling technique with a total of 99 Indonesian Pilots. The data was collected using a questionnaire with a Likert scale which was processed using SPSS version 25. The research method used was multiple linear regression. The results of this study indicate that the Emotional Intelligence variable has a significant effect on emergency decision making, while the airmanship variable has no significant effect on emergency decision making, at the same time the situational awareness resilience variable has a significant effect on emergency decision making by Indonesian Pilots. The results of this study are expected to improve flight safety in Indonesia.

Keywords: Emotional Intelligence, Airmanship, Situational Awareness Resilience, Emergency Decision Making

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INTRODUCTION

Transportation is a human need. In addition to meeting human needs as social beings, transportation is also present to meet the logistical needs of life support. Since the first invention of the airplane, accident after accident is unavoidable. This is due to the limited knowledge and resources needed for the development of this technology. Along with the development of research and technology in the world of aviation, one by one the factors causing

aircraft accidents can be eliminated. Currently, airplanes are the safest means of transportation in the world. Based on data from ICAO (International Civil Aviation Organization), KNKT (National Transportation Safety Committee) and DKPPU (Directorate of Airworthiness and Aircraft Operation) of the Ministry of Transportation of the Republic of Indonesia, currently Aircraft is a means of transportation with the highest level of safety among other means of transportation. This is inseparable from improvements in the operating system, maintenance, and improvement of rules in aviation safety and security.

Annual accident statistics show an increase in both the total number of accidents and the global accident rate in 2019. From 2018 to 2019, there was a 16 percent increase in the total number of accidents, as reported by regulators worldwide.

The global accident rate of 2.9 accidents per million departures also increased by 12 percent from the 2018 level of 2.6 accidents per million departures. The accidents used for these statistics were reviewed and validated by the ICAO Safety Indicators Study Group (SISG), and involve the scheduled commercial operation of aircraft with a certified maximum takeoff weight (MTOW) of more than 5,700 kg as defined in ICAO Annex13 Aircraft Accident and Incident Investigation.

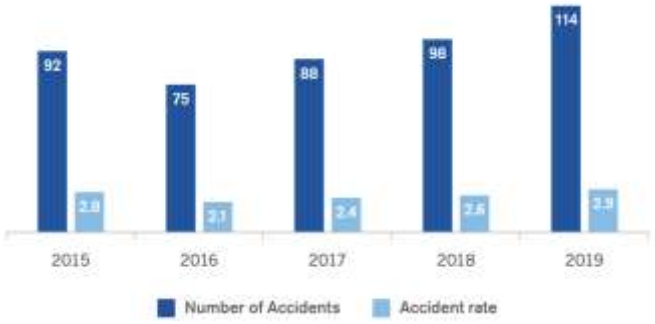

Figure 1. Accident Record: 2015-2019 Schedule Commercial Operation

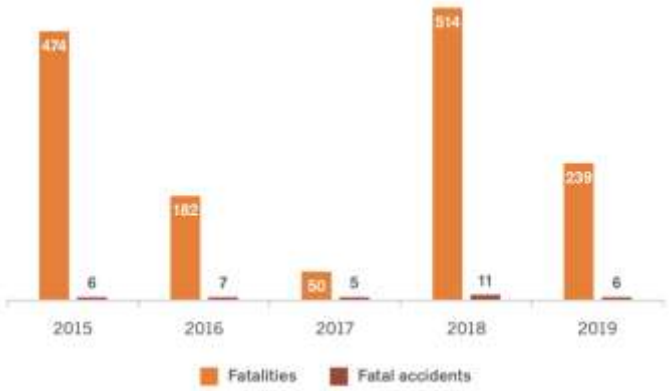

Figure 2. Fatal Accident Record: 2015-2019 Scheduled Commercial Operation

The causes of aircraft accidents include human resources or human error, aircraft engines, weather and nature, as well as facilities and infrastructure for airworthiness. Among the causes of the plane crash, based on the recorded data, the HR factor or Human Error is the highest causal factor and this cannot be separated from the Pilot's Decision Making in a flight. According to Dismukes, Berman and Loukopoulos (2007) explained that human cognitive processes such as attention, alertness, memory and decision making are inherently vulnerable even among airline pilots. Errors are largely unpredictable because the interaction of factors that contribute to error generation is probabilistic.

Decision making in a flight by a pilot greatly affects the purpose of flight safety and security, therefore a pilot is trained in various flight conditions ranging from normal conditions to emergency conditions with standard rules and equality of qualification assessments and regular health and competency tests are carried out every 6 months. However, there are 3 aspects that regulators and flight operators must pay attention to, including 1. Emotional Intelligence of an Airman, 2. Airmanship and 3. Situational Awareness Resilience of a Pilot who has limitations on Emergency Decision Making Strategies. However, in some cases these 3 aspects are still not considered. In making decisions on a flight, a pilot is always based on regulations, procedures and standard knowledge of aviation, but in an emergency situation there are three factors, namely emotional intelligence, airmanship and the resilience of a pilot's situational awareness. Based on the background of the problem above, it can be identified several main problems for a pilot in making decisions in emergency situations, namely emotional intelligence, airmanship and resilience of situational awareness. Thus, this study is to identify what factors are the most dominant that affect Indonesian Pilot Decision Making.

LITERATURE REVIEW

Emergency Decision Making

Decision making is the process of choosing two or more alternatives. The choices made are based on rational considerations that have more priority for the organization than other alternatives (Robbins, 1984). It is also said that decision making is a process where there are several steps that must be taken and evaluating alternatives to decide from all available alternatives (Drummond, 1995; Mondy & Premeaux, 1995; Mckeachie, 1986 in Alwizra et al, 2020). Based on Human Factor Reference Guide 1st Edition PT. Garuda Indonesia (Chapter 2, Section 2.3), decision making is a cognitive process of choosing an action from several alternatives. The decision-making process produces a choice of actions or opinions that determine the behavior of the decision maker and therefore has a great influence on task performance. It can be concluded that decision-making in the aviation environment involves

all related decisions that must be made by a pilot during flight. This includes decisions to go or not to leave before the flight as well as those made during the flight. In aviation decision making is very important because of the safety consequences of bad decisions. Terry (in Syamsi, 2000) explains the basics of applicable decision making, namely:

1. Intuition

Decisions made based on intuition are subjective, that is, they are easily exposed to suggestions, external influences, and other psychological factors.

2. Experience

In this case, experience can be used as a guide in solving problems. Decisions based on experience are very beneficial for practical knowledge. Experience and the ability to predict what is the background of the problem and how to solve it is very helpful in facilitating problem solving.

3. Facts

Decisions based on several facts, data or sufficient information are indeed good and solid decisions, but getting enough information is very difficult.

4. Authority

Decisions based on authority will lead to routine nature and are associated with dictatorial practices. Decisions based on authority sometimes by decision makers often go beyond the problems that should be solved but become blurred or less clear.

5. Rational

Rational decisions related to usability. The emergence of the problems faced is a problem that requires a rational solution. Decisions made based on rational considerations are more objective. In society, rational decisions can be measured if the optimal satisfaction of the community can be carried out within the limits of the community values recognized at that time. So, the basis for making decisions is based on intuition, experience, facts, authority, and rationality.

Emotional Intelligence

Emotional intelligence is the ability to understand and control and manage emotions or feelings in oneself and in dealing with others (Ardiansyah & Sulistiyowati, 2018). Daniel Goleman (1995) states that emotional intelligence plays a much more important role than IQ

or expertise in determining who will be the star in a job. There are 5 factors that affect a person's Emotional Intelligence, namely Self-awareness, Self-arrangement, Motivation, Empathy, and Social Skills.

Based on the CRM Manual 1st edition of PT. Garuda Indonesia (1.1.10 Page 8), the factors that affect the mental intelligence of a pilot are Fear, Anger, Frustration, Worry and Anxiety (CRM Manual, 2017). These factors are an unavoidable part of human life. Under ideal conditions these factors are still needed in small quantities for a pilot to achieve optimal performance.

The results of the study state that 90% of important decisions are made based on intuition (Klein, 2002). Intuition is fundamental to the decision-making process and cannot be replaced by analysis or procedure. Intuition is awakened by the process of unifying various experiences and forming a pattern (Klein, 2003). This statement is strengthened by Simpson (2001), who describes the decision-making process on a cognitive continuum, where decision-making strategies are intuitively opposed to analytical strategies.

The most common conceptualization of intuition refers to problem solving intuition and is used when dealing with a problem solving dilemma or making a decision (Hogart, 2001). Intuition in decision making is closely related to the domain of knowledge or expertise. Robbins and Judge (2017) state that intuitive decision making can be done under the following conditions:

1) high uncertainty

2) limited/incomplete evidence or data

3) the variables cannot be predicted rationally / scientifically

4) limited facts

5) not completely facts related to the problem

6) limited data to be analyzed,

7) there are several good and argumentative alternative solutions, and

8) time constraints.

Airmanship

Airmanship is the ability to exercise good judgment, demonstrate inviolable flight discipline and demonstrate proficiency in flying an aircraft, and every decision a pilot makes must be

supported by good airmanship (Spencer and Ebbage, 2003). According to Spencer and Ebbage (2003), airmanship has 3 aspects, namely knowledge, skills, and attitudes.

1. Knowledge consists of

Knowledge of aircraft, meaning understand the system parts of the aircraft, emergency procedures, cockpit automation, aircraft flight characteristics and operating limitations.

Knowledge of the environment, meaning understand the state of the environment and its influence in controlling the aircraft, understand the regulations of the surrounding environment, understand the organizational environment.

Knowledge of risk, meaning understanding a risk in order to form discipline, expertise and agility, knowledge.

2. Skills consist of

Physical skills. Ability or skill in flight, navigation, instrument flight, emergency handling, survival.

Skills in managing the cockpit. Avoid anything that makes you bias and be able to manage all information.

Skills in communication. Always alert in observing communication, using appropriate communication, active in listening and investigating communication to completion.

Cognitive skills. Understand and maintain all situations consciously, have the ability to solve problems and make a decision, understand and manage workloads and be able to do self-assessment.

Skills in groups (teams). Able to monitor work, lead or take the initiative, able to interact or communicate in groups and can coordinate and make a decision.

3. Attitudes consist of

Dangerous attitude. Understand five dangerous attitudes that must be prevented and can have an impact on airmanship. The five attitudes are anti-authority, impulsive action, invulnerability, overconfidence and easily give up.

Professionalism. Understand the scope and realize the principle or basis of airmanship.

Self progress. Develop a need as a reason or impetus to learn about life. Understand the conditions that exist for self-assessment and develop the ability to obtain good results.

Discipline. Discipline in flight preparation, adhering to aviation discipline (maintenance, working procedures and regulatory policies), knowledge and skills in maintenance, post-flight evaluation and self-discipline (managing stress and managing attitudes).

Situational Awareness Resilience

Situational Awareness is the ability to understand and master the situation around us, and be able to distinguish between perceptions and the reality that occurs around us in a conscious state. In the world of aviation, situational awareness is defined as the perception of environmental elements in a volume of space and time, understanding their meaning and projecting their status in the near future (Endsley, 1999). Conceptually, situation awareness is divided into three levels, namely perception (level 1), understanding of the situation (level 2) and anticipation of future events (level 3). Situational awareness is very important in the context of pilot decision-making and action, especially for those working in complex systems and dynamic environments.

Relationship between variables

Emotional intelligence is the ability to understand and control and manage emotions or feelings in oneself and in relationships with others. From this understanding, the Emotional Intelligence of a Pilot is closely related to decision making in emergency situations. If a pilot has good emotional intelligence, it is possible that the pilot will avoid human error and be right in making decisions in emergency situations.

Airmanship is the ability to exercise good judgment, demonstrate inviolable flight discipline and demonstrate proficiency in flying an aircraft. Every decision a pilot makes must be supported by good airmanship. From this understanding, the Airmanship of a Pilot is closely related to decision making in emergency situations. With good airmanship, children support the pilot every time they carry out procedures and regulations so that they are right in making decisions in emergency situations.

Situational Awareness is the ability to understand and control the situation around us, and to be able to distinguish between perceptions and the reality that occurs around us in a conscious state. From this understanding the Situational Awareness of a Pilot is closely related to decision making in emergency situations. By maintaining situational awareness, the pilot will continue to think logically based on science, regulations, and procedures in making decisions in emergency situations.

Below is the conceptual framework of this study that developed according to the problem identification and literature review.

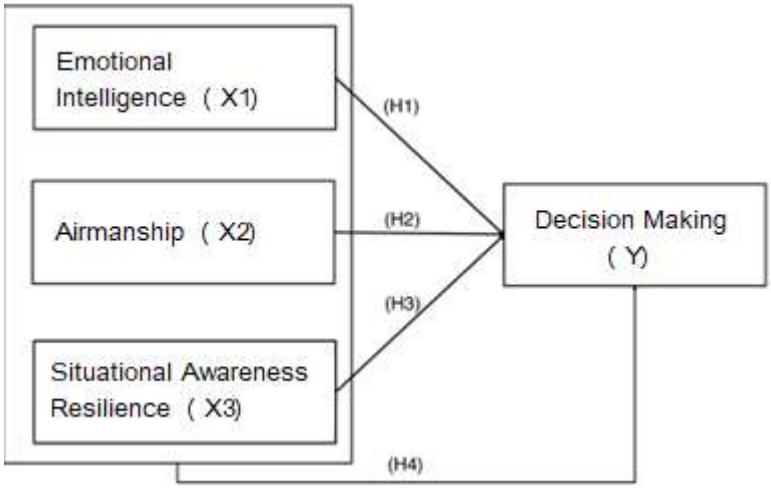

Figure 3. Conceptual Framework

The formulation of the hypothesis in this research as follow:

H1. Emotional Intelligence influences emergency decision making

H2. Airmanship influences emergency decision making

H3. Situational Awareness Resilience influences emergency decision making

H4. Emotional Intelligence, Airmanship, and Situational Awareness Resilience influence emergency decision making

METHODS

The study used quantitative method by applying descriptive associative research to analyze the causal relationship of Emotional intelligence, airmanship, and situational awareness resilience on emergency decision making. The population in this study were 9,794 pilots consisting of 9,427 male pilots and 367 female pilots. In this study, the samples consist of several Indonesian pilots who worked for national airlines, international airlines and Indonesian pilots who had not worked yet for airlines. Using probability sampling technique with simple random sampling method, the sampling member is carried out randomly without regard to the strata that exist in the population. The data was collected using a questionnaire with a Likert scale. A total of 99 samples were collected, then the data was processed using SPSS version 25. The research method

used was multiple linear regression. Validity and Reliability tests were conducted first before continuing to the hypothesis testing.

RESULT AND DISCUSSION

The characteristics of the respondents in this study showed that the majority were aged 30-39 years, 91.9% were male, 29.3% had worked for 11-15 years, 38.4% had 5001-10000 flight hours, 70.7% were in the captain's position, 27.3% came from the Indonesian Aviation College (STPI). The detail can be seen in the table below:

Table 1: Respondent Characteristics

	Category	**%**		**Category**	**%**
Age	20-29 y.o	15,2	Position	Captain	70,7
	30-39 y.o	43,4		First Officer	18,2
	40-49 y.o	29,3		Co-pilot	1
	50-59 y.o	10,1		Pension	1
	60-69 y.o	2		PIC	3
Gender	Man	91,9		Senior First Officer	4
	Woman	8,1		Student	2
Length of work	1-5 years	13,1	Ex Flying School	Alfa Flying School	3
	6-10 years	28,3		Australian Aviation College	2
	11-15 years	29,3		Bali International Flight Academy (BIFA)	14,1
	16-20 years	12,1		Deraya Flying School	9,1
	21-25 years	6,1		PLP Curug	11,1
	26-30 years	7,1		Indonesian Aviation College (STPI)	27,3
	31-35 years	2		Southwind Aviation Academy - USA	3
	36-40 years	2		Southwind Flight Academy	3
Flight hours	1-1000 hours	5,1		Others	27,3
	1001-5000 hours	21,2			
	5001-10000 hours	38,4			
	10001-15000 hours	24,2			
	15001-20000 hours	7,1			

Category	%	Category	%
> 20000hours	4		

There are 4 variables in this study, namely Emotional Intelligence (X1), Airmanship (X2), Situational Awareness Resilience (X3), and Emergency Decision Making (Y). Each variabel consists of 20 indicators. First, validity and reliability test are conducted to test the research instrument. Based on the results of testing the validity of the instrument, the indicators X1.12, X1.16, X1.20, X3.1, X3.6, X3.10, X3.13, X3.15, X3.17, X3.20, Y.1 , Y.2, Y.3, Y.13, Y.14, and Y.20 resulted in a correlation coefficient value smaller than r table = 0.1975. Thus, it can be concluded that the questions X1.7, X1.9, X1.10, X2.3, X2.6, X2.7, and X2.9 are declared invalid and cannot be used as data collection tools in this study. So, it is reduced gradually. After gradual reduction, it was found that all indicators produced a correlation coefficient value greater than r table = 0.1975. Thus, it can be concluded that all indicators are valid. Instrument Reliability Test is used with the aim of knowing the consistency of the instrument as a measuring instrument. Based on the table below, each variable has Cronbach alpha value greater than 0,60. So, it can be concluded all questions in this research variable were declared consistent, reliable, and suitable to be used as a data collection tool.

Table 2: Reliability Test

Indicator	Cronbach Alpha
Emotional Intelligence (X1)	0,875
Airmanship (X2)	0,955
Situational Awareness Resilience (X3)	0,743
Decision Making (Y)	0,848

Classical assumption testing is required before proceeding to multiple regression testing. Based on the table below, the normality test was conducted using Kolmogorov Smirnov test, where the result showed sig 0,055 that greater than 0,05. This means that the residuals in the model are declared normally distributed. Thus, the assumption of normality is met.

Table 3: Classical Assumption Test

Normality Test	
Kolmogorov Smirnov	**Sig**
0,088	0,055

Multicollinearity test		
Variable	**Tolerance**	**VIF**
Emotional Intelligence	0,588	1,701
Airmanship	0,442	2,263
Situational Awareness Resilience	0,681	1,468
Heteroscedasticity Test		
Chi-Square	**df**	**Sig.**
12,582	9	0,182

Multicollinearity testing is intended to determine whether there is a relationship between the independent variables. The results show that all independent variables produce a tolerance value greater than 0.1 and a VIF value less than 10. Thus, it can be stated that the model has no symptoms of multicollinearity. So that the assumption of multicollinearity is met. heteroscedasticity testing is used to determine whether the residuals have a homogeneous variance or not. Based on the result, heteroscedasticity assumption shows that the model produces a significance greater than the level of significant (α=5% or 0.05). This means that the residual is declared to have a homogeneous variance. Thus, the assumption of heteroscedasticity is met.

Table 4: Regression Analysis Result

Variable	Coefficient	T Statistics	Sig.
(Constant)	0,049	0,095	0,925
Emotional Intelligence	0,285	2,020	0,046
Airmanship	-0,127	-0,934	0,353
Situational Awareness Resilience	0,344	2,633	0,010

Based on the results in table 4, it can be seen that the statistical t value is 2.020 with a significance value of 0.046. The significance value is smaller than the significant alpha 5% or 0.05. This means that there is a significant effect of Emotional Intelligence (X1) on Emergency Decision Making (Y). So that hypothesis 1 is accepted. The resulting coefficient is 0.285 (positive) which means that the higher the Emotional Intelligence, it tends to increase the Emergency Decision Making. The decision-making process produces a choice of actions or opinions that have a great influence on task performance. Therefore, pilot decision-making in an emergency situation is one of the pilot's performance in carrying out their duties. In dealing with critical situations, not only technical steps are taken, but also mental conditions including thoughts and feelings at that time also influence and can contribute to aircraft safety. The

results of this study are in line with research from Subandijo (2012) which concluded that there is an influence of emotional intelligence on emergency decision making. The results of Perwitasari's research (2015) also conclude that Emotional Intelligence has a significant effect on decision making.

Based on the results in table 4, it can be seen that the statistical t value is -0.934 with a significance value of 0.353. The significance value is greater than the significant alpha 5% or 0.05. This means that there is no significant effect of Airmanship (X2) on Emergency Decision Making (Y). So that hypothesis 2 is rejected. The pilot's knowledge, skills, and discipline have no effect on pilot decision-making during an emergency situation. The results of this study are not in line with research from Ebbage and Spencer (2003) which concluded that Airmanship has a positive effect and is one of the keys to flight safety. The key to flight safety is one of the successes of pilots in making decisions during emergency situations.

Based on the results in table 4, it can be seen that the statistical t value is 2.633 with a significance value of 0.010. The significance value is smaller than the significant alpha 5% or 0.05. This means that there is a significant effect of Situational Awareness Resilience (X3) on Emergency Decision Making (Y). So that hypothesis 3 is accepted. The coefficient is 0.344 (positive) which means the better the pilot's awareness, the better the pilot will understand the conditions or the flight path environment, so that the pilot will be more alert and careful when carrying out their duties. The results of this study are in line with research from Pruchnicki, Key, and Rao, (2019) which concluded that the unexpected situation variable partially had a positive and significant effect on the decision-making process.

Table 5: F-Test

	Sum of Squares	df	Mean Square	F	Sig.
Regression	3,114	3	1,038	4,750	0,004
Residual	20,762	95	0,219		
Total	23,877	98			

Based on the results in table 5, it can be seen that the statistical f value is 4,750 with a significance value of 0.004. The test results show probability > level of significance (0.05). This means that there is a significant influence of Emotional Intelligence, Airmanship, and Situational Awareness Resilience simultaneously on Emergency Decision Making. So that hypothesis 4 is accepted. With emotional intelligence, pilots can detect and manage their own emotions so that they are useful for decision making. In addition, pilots can combine knowledge, skills and experience according to him to be able to make decisions in all situations (Airmanship). The

resilience of situational awareness where the pilot is able to know the surrounding conditions in flight is very useful in decision making. The results of this study are in line with research from Firmansyah and Nailul (2016) which concluded that the internal factors for flying experience when rescuing aircraft from critical situations are experience, education period, and flight training. The results of research from Wibowo (2017) conclude that Airmanship and Safety culture, one of which is awareness, simultaneously has a significant effect on flight safety. The results of Perwitasari's research (2015) also conclude that Emotional Intelligence has a significant effect on decision making.

Table 6: Coefficient Determination

Model	R	R Square	Adjusted R Square
1	0,361	0,130	0,103

The coefficient of determination is used to determine the magnitude of the diversity of the independent variables in explaining the diversity of the dependent variable. The value of Adjusted R-square in the model is 0.130 or 13.0%. This can indicate that the Emergency Decision Making variable can be explained by the variables of Emotional Intelligence, Airmanship, and Situational Awareness Resilience only by 13.0%, while the remaining 87.0% is the contribution of other variables not discussed in this study.

CONCLUSION, MANAGERIAL IMPLICATIONS, LIMITATION AND FUTURE RESEARCH

In making decisions on a flight, a pilot is always based on regulations, procedures, and standard knowledge of aviation, but in an emergency situation, some factors such as emotional intelligence, airmanship and the resilience of a pilot's situational awareness needed to be owned by pilot. Based on the analysis and discussion, it is proved that partially Emotional Intelligence, and Resilience Situational Awareness have a significant effect on Indonesian Pilot Emergency Decision Making. The higher the Emotional Intelligence, the better the level of emergency decision making. The higher the resilience of the pilot's situational awareness, the higher the emergency decision making of Indonesian pilots. While Airmanship does not have a significant effect on emergency decision making. It is due to the Indonesian Airmanship Pilot has been formed since the beginning of the initial training as a Pilot. Based on the findings, there are some suggestions for improvement. Management is expected to be able to train pilot's emotional intelligence with exercises so that it can improve pilot's emotional intelligence. Environmental factors also affect the pilot's emotional intelligence; therefore, it is necessary to have comfortable environmental conditions within the scope of work to increase the pilot's emotional intelligence. Airlines also need to maintain good training and development of Airmanship pilots so that emergency decisions are always measured and accurate. In term od

resilience situational awareness, the airlines are expected to maintain a good working climate or environment so that they can provide a conducive working atmosphere and gain a lot of experience in flight that will help pilots to handle emergency situations. For future research, some variables such as organizational culture, competence, compensation, weather factors, aircraft age, airport facilities, or others can be added to more insight.

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