

Effect of Effectiveness of Use of Electronic Flight Bags on Flight Safety at PT. Garuda Indonesia

Johar Samosir, ITL Trisakti, joharsamosir@yahoo.co.id
Sarinah Sihombing, ITL Trisakti, sarinah.stmt@gmail.com
Hendro Kuntohadi ITL Trisakti, hkuntohadi2011@gmail.com
JohannesKurniawan ITL Trisakti, johanneskurniawan@gmail.com
Abdulrachman Naufal Akbar, ITL Trisakti, abdulrachman@gmail.com

Abstract---Flight safety is a state of fulfilling safety requirements in the use of airspace, aircraft, airport, air transport, flight navigation, and supporting facilities and other public facilities. To support flight safety, effective and efficient technology is needed in order to influence flight safety. In this study, researchers chose Electronic Flight Bag to be the system used to support flight safety. The purpose of this study was to analyze the effect of the effectiveness of the use of Electronic Flight Bag on Flight Safety of PT. Garuda Indonesia. The research design uses a quantitative descriptive approach. The data used in this study came from primary data obtained based on the distribution of questionnaires distributed to the research sample of 30 pilots of all PT. Garuda Indonesia with B777-300R aircraft type with Simple Linear Regression data analysis techniques. The results of this study indicate the effectiveness of the use of Electronic Flight Bags has a positive and significant effect on flight safety by 18.5%. The effectiveness of the use of Electronic Flight Bag PT. Garuda Indonesia of 0.396 in this case can be interpreted that there is a positive relationship. The moment coefficient value of 0.431 between the EFB effectiveness variable and the flight safety variable can be said to be moderate. And there is a 0.017 level of significance can prove the level of significance is below 0.05 in a positive direction so there is a relationship between the effectiveness of EFB with flight safety. Then the results of this study were rejected H_0 and H_a accepted.

Keywords---Effectiveness, Electronic Flight Bag, Flight Safety.

I. INTRODUCTION

According to Law No. 1 of 2009 states that aviation is part of the national transportation system which has the characteristics of being able to move in a fast time, using high technology, capital intensive, reliable management, and requires optimal safety and security guarantees, potential and roles need to be developed. effective and efficient, and helps create a stable and dynamic national distribution pattern.

According to Effendy (2008) defines effectiveness as communication that the process of achieving the planned objectives in accordance with the budgeted costs, time determined and the number of personnel determined. Effectiveness according to the above understanding means that indicators of effectiveness in the sense of achieving goals or a predetermined goal is a measurement in which a target has been achieved in accordance with what has been planned.

Flight safety is very important for every airline along with the development of technology that is very advanced as it is today. The cause of aircraft accidents is usually caused by 3 main factors, namely: technical factors, weather factors and human error factors (human error). the most dominant factor is the human factor (human error) 32.09% and the technical factor (technical) as much as 31.87%. The fact is clearly seen how the

accident with the air transportation mode is quite high compared to other transportation namely:

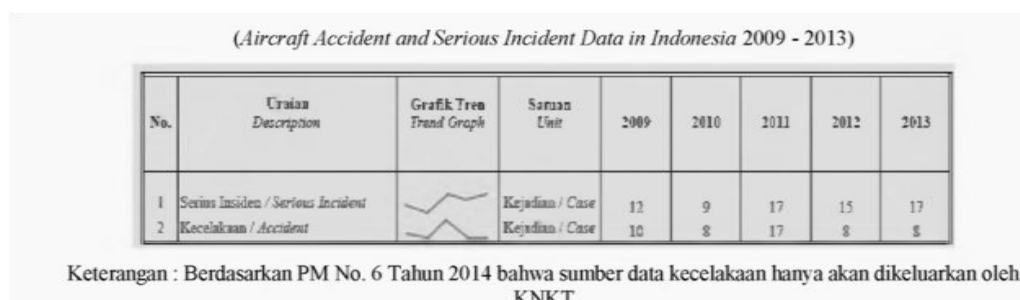


Figure 1 Data on Accidents and Serious Incidents on Aircraft in Indonesia

Based on the picture above, aviation accidents in Indonesia that fall into the serious group of incidents are higher than the accident group. This is a fairly complicated problem.

The problems regarding aviation are inseparable from the development of technology in the world of aircraft whose regulation of air law itself is still very new. The more sophisticated the technology, the more stringent humans learn in following the development of the technology. Technology is understood as everything that involves the means or techniques of producing, using, and maintaining all equipment and supplies. Likewise in transportation from year to year the transportation technology system in Indonesia is increasing, especially in the field of air transportation, there are many good and sophisticated aircraft. The use of modern technology for aircraft is very important in increasing work effectiveness and flight safety.

This latest technology is Electronic Flight Bag, a device-shaped technology and its use is to help pilots and flight crew perform flight management tasks, such as completing flight performance and overload calculations.

easy and efficient. This also makes it easier for airlines to confirm that pilots have the latest manuals and information, and to distribute updates when needed.

Any sophisticated technology will surely have flaws that will cause problems for the aircraft as well as for the airline itself. As happened to Garuda Indonesia airlines in 2012 experiencing delays in receiving information on the takeoff path at the Amsterdam Schiphol airport that was being renovated, due to the late receipt of information Garuda Indonesia airlines were subject to fines because Garuda Indonesia airplane pilots took off on routes that should not have been crossed because of the renovation process at Amsterdam's Schiphol airport. Because it is detrimental to the Garuda Indonesia airline and certainly threatens the safety of the flight itself.

The delay in receiving this information was caused by human error due to the Operation System Publication (OSP) division at PT. Garuda Indonesia does not update the latest information that should have entered the Electronic Flight Bag for the pilot before the flight was made so the pilot did not know that the takeoff line at Amsterdam's Schiphol airport may not be used for takeoff.

Electronic Flight Bags can only be used on A330 and B777 aircraft types, and only enter the data needed on one flight such as: Airport Map, Performance, Terminal Chart, and other Documents. Electronic Flight Bag is not like Traditional Paper Flight Bag,

Traditional Paper Flight Bag is a conventional paper-based flight bag containing comprehensive information about what is needed by the pilot when the aircraft is in excess if something unexpected happens or in an emergency, pilots can search or get complete information on the Traditional Paper Flight Bag, while the Electronic Flight Bag only input data needed because of limited storage on the Electronic Flight Bag so that in the event of an emergency the pilot must determine for himself what steps should be taken to save the flight.

Electronic Flight Bag (EFB) is a device / system of counters / displays and systems that can be used by flight crew / pilots for various functions. Using EFB can reduce or eliminate the need for paper and other reference materials in the cockpit (Allen, 2014).

EFB stands for Electronic Flight Bag is the addition of a tool in the form of the addition of a set of computers to facilitate and ease the routine work of pilots and do not use paper anymore (Less paper cockpit). EFB features depend on the options or choices of each airline usually airlines have a standard option what is needed for flights in EFB installed on their plane (Budi setiawan, 2008).

II. Research Methods

The study was conducted at PT. Garuda Indonesia Cengkareng, Soekarno-Hatta Airport. So that this research is in accordance with what is expected, the authors limit the scope of research, namely PT. Garuda Indonesia, Cengkareng.

Population is a generalization area consisting of objects / subjects that have certain qualities and characteristics determined by researchers to be studied and then conclusions Sugiyono (2016).

The population in this study were 30 respondents, namely all pilots of PT. Garuda Indonesia with aircraft type B777-300R.

Determination of the sample in this study was carried out by the technique of saturated sample (census), which is a sampling method when all members of the population are sampled. This is often done if the population is small (Sugiyono (2016).

In this study, samples were taken as many as 30 people, namely all pilots with aircraft type B777-300R PT. Garuda Indonesia is in accordance with the characteristics of the research sample, which means the entire population is made a research sample.

The data analysis technique used is simple linear regression to answer the problem formulation or test the hypothesis that has been formulated in the study. Because the data is quantitative, the data analysis technique is using Sugiyono's statistical method, (2016)

III. Results and Discussion

The following are the results of respondents' answers to statements regarding Variable (X) Effectiveness of EFB submitted in the questionnaire

Tabel 1
Recapitulation of Respondent Responses to Flight Safety Effectivity (X)

No	Pernyataan	Jawaban					Total	Rata-Rata	Keterangan
		SS	S	RG	TS	STS			
1	Adanya alur komunikasi informasi antara Pilot dengan <i>Flight Operation Office</i>	25	64	27	0	0	116	3,86	BAIK
2	Adanya teknologi informasi memudahkan komunikasi pilot dengan <i>Air Traffic Control</i>	40	76	9	0	0	125	4,16	BAIK
3	EFB memberikan informasi tentang navigasi penerbangan	15	64	33	0	0	112	3,73	BAIK
4	EFB memberikan informasi mengenai <i>Enroute Alternate</i>	20	32	48	4	0	104	3,46	BAIK
5	EFB mempermudah kinerja pilot	15	64	30	0	1	110	3,66	BAIK
6	EFB dapat mempengaruhi <i>Total Ground Time</i>	30	76	9	4	0	119	3,96	BAIK
7	Mempercepat pilot dalam <i>prepare for the flight</i>	15	56	30	6	0	107	3,56	BAIK
8	Mempermudah pilot dalam perhitungan <i>take-off & landing</i>	30	72	18	0	0	120	4	BAIK
9	Mempermudah pilot dalam keadaan <i>emergency</i>	40	52	27	0	0	119	3,96	BAIK
10	Mengurangi beban pesawat	45	52	24	0	0	121	4,03	BAIK
Rata- Rata Keseluruhan								3,83	BAIK

Sumber : diolah oleh penulis Based on table 1 above respondents' answers as a whole the value of the variable (X) "Effectiveness of EFB" included in the category of Good with an

average value of 3.83 This shows that the effectiveness of EFB is able to give a good influence on Flight Safety of PT. Garuda Indonesia with aircraft type B777-300ER.

1. EFB (X) Effectiveness Variable Validity Test

The author conducted a validity test and a reliability test for the "EFB Effectiveness" variable using SPSS 20.00 with the validity testing criteria through SPSS.

Valid = Corrected Item Total Correlation > 0.3061

Invalid = Corrected Item Total Correlation < 0.3061

Tabel 2
Validity Test Results of Effectiveness EFB

Variabel	Butir Pernyataan	Corrected Item Total Correlation	r tabel	Keterangan
Efektivitas	1	0,708	0,3061	VALID
	2	0,572	0,3061	VALID
	3	0,673	0,3061	VALID
	4	0,790	0,3061	VALID
	5	0,771	0,3061	VALID
	6	0,768	0,3061	VALID
	7	0,882	0,3061	VALID
	8	0,763	0,3061	VALID
	9	0,752	0,3061	VALID
	10	0,770	0,3061	VALID

Sumber : Pengolahan data kuesioner dengan Spss 20.00

From the table above the results of the validity test can be concluded that the EFB Effectiveness variable questionnaire is "Valid".

2. EFB (X) Effectiveness Variable Reliability Test

Tabel 3
Reliability test results EFB

Cronbach's Alpha	N of Items
,776	10

Sumber: Pengolahan data kuesioner dengan SPSS 20.00

Criteria for testing reliability through SPSS:

Reliability = Cronbach's Alpha > 0.60

No Reliability = Cronbach's Alpha < 0.60

From table 3 the reliability test results above, it can be concluded that the EFB Effectiveness variable questionnaire can be declared "reliable".

Tabel 4
Recapitulation of Respondent Responses to Flight Safety(Y)

No	Pernyataan	Jawaban					Total	Rata - rata	Keterangan
		SS	S	RG	TS	STS			
1	Mengurangi risiko kecelakaan penerbangan	70	52	9	0	0	131	4,36	Sangat Baik
2	Mengurangi tingkat <i>human error</i>	45	52	24	0	0	121	4,03	Baik
3	Adanya EFB memastikan kondisi performance pesawat	70	56	6	0	0	132	4,4	Sangat Baik
4	EFB memenuhi standar CASR	40	32	36	4	0	112	3,73	Baik
5	Adanya <i>operation manual</i> dalam EFB	40	32	30	9	1	112	3,73	Baik
6	<i>EFB meminimalisir risiko kecelakaan dalam penerbangan</i>	60	36	21	4	0	121	4,03	Baik
7	Melaksanakan tugas atau pekerjaan sesuai dengan prosedur yang ada	40	36	33	4	0	113	3,76	Baik
8	Mempertanggung jawabkan semua tindakan pekerjaan yang dilakukan	25	60	18	8	0	111	3,7	Baik
9	Penginputan data secara berkala	50	40	27	2	0	119	3,96	Baik
10	Data penerbangan yang terinput sesuai dengan yang dibutuhkan	40	68	12	2	0	122	4,06	Baik

No	Pernyataan	Jawaban					Total	Rata - rata	Keterangan
		SS	S	RG	TS	STS			
Rata – rata keseluruhan								3,97	Baik

Source: processed by the author

Based on table 4 above respondents' answers as a whole the value of the variable (Y) "Flight Safety" included in the Good category with an average value of 3.97. This shows that the Aviation Safety variable of PT. Garuda Indonesia with the type of aircraft B777-300R is good.

3. Aviation Safety Variable Validity Test (Y)

The author conducts the validity test and the reliability test of the Aviation Safety variable using SPSS 20.00 using the validity testing criteria through SPSS.

Tabel 5
Validity Test Results Safety Flight (Y)

Cronbach's Alpha	N of Items
,742	10

Novalid = *Corrected Item Total Correlation* < 0,03061

Valid = *Corrected Item Total Correlation* > 0,3061

Tabel 6
Reliability Test Results Safety Flight (Y)

Variabel	Butir Pernyataan	Corrected Item Total Correlation	r tabel	keterangan
Keselamatan Penerbangan	1	0,619	0,3061	VALID
	2	0,514	0,3061	VALID
	3	0,703	0,3061	VALID
	4	0,513	0,3061	VALID
	5	0,715	0,3061	VALID
	6	0,446	0,3061	VALID
	7	0,764	0,3061	VALID
	8	0,489	0,3061	VALID
	9	0,528	0,3061	VALID
	10	0,563	0,3061	VALID

Sumber : Pengolahan data kuesioner dengan Spss 20.00

From table 6 of the validity test above, it can be concluded that Aviation Safety can be declared "VALID".

4. Data Analysis With Statistical Hypothesis Testing

The table below will show the coefficients of the variable X to show the effect each variable will have on the Y variable whether or not significant, here is a table that shows the coefficient of the variable X on the Y variable.

a. Statistical Testing

1) Simple linear regression

Tabel 7
Calculation Result of Coefficients Testing

Model	Unstandardized Coefficients	Standardized Coefficients		t	Sig.
	B	Std. Error	Beta		
1 (Constant)	24,374	6,078		4,010	,000
Efektivitas	,396	,157	,431	2,530	,017

a. Dependent Variable: Safety flight

Sumber : Pengolahan data kuesioner dengan SPSS 20.00

According to Sugiyono (2016) states that simple linear regression is based on the functional or causal relationship of an independent variable with a dependent variable.

$$Y' = a + bX$$

From the above equation we get:

$$Y = 24,374 + 0,396 X$$

From the above equation that has been inputted with the coefficient data obtained, it can be translated with a statement like the following:

From the regression equation, it can be seen that the Effect of the Effectiveness of the Use of Electronic Flight Bags on Flight Safety is unidirectional (positive), it is shown in the regression coefficient or the value of b in the regression equation which shows a positive number of 0.396. So in this case it can be interpreted that there is a positive relationship between the Effectiveness of the Effectiveness of the Use of Electronic Flight Bags to Flight Safety, if the value of the Effectiveness of Electronic Flight Bag increases by 1 then, the value of Flight Safety will increase by 0.396, or the better the Effectiveness of EFB that is carried out increases Flight Safety.

b. Pearson Product Moment Correlation Analysis

According to Sugiyono (2016) that this correlation technique is used to find a relationship and prove the hypothesis of a relationship between two variables if the data of the two variables are in the form of intervals or ratios and the data sources of the two or more variables are the same.

Tabel 8
Correlations Test Results

		efektivitas	Keselamatan penerbangan
Efektivitas	Pearson Correlation	1	,431 [*]
	Sig. (2tailed)		,017
	N	30	30
Keselamatan penerbangan	Pearson Correlation	,431 [*]	1
	Sig. (2tailed)	,017	
	N	30	30

*. Correlation is significant at the 0.05 level (2-tailed).

Sumber : Hasil pengolahan data kuesioner dengan SPSS 20.00

Table 8 above explains that 0.431 value of the product moment correlation coefficient, between the effectiveness variable and the flight safety variable can be said to be being seen at the coefficient interval there are 0.017 levels

c. Analysis of the Coefficient of Determination significance can prove the level of significance is below 0.05 in the positive direction so there is a relationship between effectiveness.

Tabel 9
Coefficient table Result Testing

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,431 ^a	,186	,157	4,623

Sumber : Hasil pengolahan data kuesioner dengan SPSS 20.00

Summary Model

a. Predictors: (Constant), effectiveness

The coefficient of determination function, namely the ability of variable X to influence the variable Y. The greater the coefficient of determination, the better the ability of X to influence Y. To state the size of the contribution of independent variables to the dependent variable can be determined by the formula of the coefficient of determination as follows:

$$BC = (R^2 \times 100\%) = (0.431^2 \times 100\%)$$

$$BC = 0.185 \times 100\%$$

$$BC = 18.5\%$$

From the calculation of the coefficient of determination above, the writer can obtain the value of the contribution of these effects. So the magnitude of the Effect of Effectiveness of the Use of Electronic Flight Bags is 18.5% on Flight Safety, while the remaining 81.5% has an effect on other factors not explained in this study.

d. Hypothesis test

1) Initial Hypothesis

Ho: $p = 0$ then there is no significant relationship between variables X and Y

Ha: $p > 0$ Then there is a significant relationship between variables X and Y.

Ho: rejected and Ha: accepted

So the effect of the Effectiveness of the Use of Electronic Flight Bags on Flight Safety is Low.

IV. Conclusions

Based on the results of research analysis in Effect of Effectiveness of Use of Electronic Flight Bag on Flight Safety of PT. Garuda Indonesia can be said that:

1. From the recapitulation table of the respondents' answers above, the overall value of the "EFB Effectiveness" variable is included in the Good category with an average value of 3.83. This shows that the effect of the Effectiveness of Electronic Flight Bag is able to provide a significant influence on Flight Safety of PT. Garuda Indonesia with B777300R aircraft type.
2. From the recapitulation table of the respondents' answers above, the overall value of the variable "Flight Safety" is included in the Good category with an average value of 3.97. This shows that Aviation Safety at PT. Garuda Indonesia with a B777-300R aircraft type is already significant.
3. Based on the simple regression equation $Y = 24,374 + 0,396 X$ shows that there is a positive influence between the Effectiveness of Using Electronic Flight Bags with Flight Safety.
4. As for the results of research that has been done shows that there is an effect of the Effectiveness of the Use of Electronic Flight Bag on Flight Safety at PT. Garuda Indonesia. This can be seen from the results Effectiveness of Use Electronic Flight Bag has an effect of 18.5% on Flight Safety. While the remaining 81.5% is influenced by several other factors.

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