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Handling Post Flight Documents PT XYZ Soekarno-Hatta International Airport: Human Error Analysis

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ABSTRACT

PT XYZ organizes the storage of Post Flight Documents in accordance with the applicable SOP. Post Flight Documents are an important part of flight operations that have an influence on company performance and reputation. Errors in managing Post Flight Documents are mostly caused by human error such as input errors and errors in writing document labels. Data input errors can affect the FATA received by the flight crew. To deal with the occurrence of human error problems, the method that can be used is the Human Error Assessment and Reduction Technique (HEART) method, which is a technique for calculating the probability of human error. The type of research used in this research is descriptive. In this study there were 6 respondents. From the results of data collection and processing using the HEART method in the Post Flight Document handling process, it can be concluded that the activity that has the largest possible error value is in the data entry process into the system which has a HEP value of 4.7607966. Meanwhile, the smallest HEP is found in the task of numbering document packages and creating a receipt record which has a HEP value of 0.02912.

Keywords: FATA, HEART Method, Human Error, Operation Support Crew, Post Flight Documents

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INTRODUCTION

An industrial system consists of several components that interact with each other to achieve certain goals. The components that make up this system include machines, the environment, and humans. In the context of industrial processes, every activity often experiences errors, which can be system errors or human errors. System errors occur due to system control in the process, and can be resolved once to avoid their occurrence in the future. On the other hand, human errors can be minimized by providing proper procedures, but the complexity of the system sometimes makes things that should be done correctly difficult to complete properly. According to (Dhillon, 2007), Human error is the failure to complete a specific task or perform an unauthorized action, which can disrupt operational schedules or cause damage to equipment. Meanwhile, (Love and Josephson, 2004) define Human error as the failure of humans to carry out tasks that have been designed with the expected accuracy, sequence, or time. Human error is a discrepancy between the results produced and those expected in the work.

Post Flight Document is a source of written information or data that is used as a statement and obtained after the flight has taken place, this post-flight document is a collection of flight documents, including Aircraft Flight Log (AFL), Weather Briefing, Notice TO Captain (NOTOC), Passenger Manifest, APB (Actual Passenger on Board), Flight Plan, Fuel Receipt, etc. All of these documents after use are not simply destroyed, but are stored as archives for the company's internal and external needs and investigations.

PT XYZ has regulated the storage of Post Flight Documents according to the applicable systems and procedures as an airline that is a role model for other airlines. Post-flight documents are an important part of flight operations that have a major impact on the company's performance and reputation. Errors in managing Post Flight Documents are mostly caused by human error factors such as input errors, errors in writing document labels and others. Errors in inputting data into the system can affect the FATA (Flight Allowance Travel Allowance) that will be received by the flight crew on duty. In addition, errors in writing document labels can affect the time of archiving documents to the central warehouse because the documents are not stored according to the flight date.

LITERATURE REVIEW

According to (Tumanggor et al, 2022), based on data processing and analysis, it can be concluded that the Human Error Probability (HEP) analysis using the HEART Method in the TBS Sorting Department has a value of 1.1103148, with the largest rework potential occurring in Task 2 of 1.10592. The determination of generic tasks in the HEART Method plays a key role in clearly describing the level of difficulty of a job. It is recommended to conduct further research that integrates time analysis as a supporter in the Human Reliability Assessment (HRA) Method.

Based on (Widharto, et al, 2018) study, it was found that a task with a HEP value of 1 indicates that the work has high complexity and requires deep understanding and skills. Meanwhile, from the EPC perspective, the task has limited time to detect failures and make corrections.

Misfiling occurs due to several factors, including the carelessness of filing officers in returning medical record documents to the proper storage containers, the absence of a standardized filing system, the absence of special training for filing officers and limited storage space which makes medical record documents too dense and difficult to organize neatly.

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RESEARCH METHOD

Human Reliability Assessment (HRA) is the process of analyzing and evaluating human interactions with a system to assess risks and their causal factors. The main objectives of HRA are to recognize the types of errors that may occur (error identification), analyze how these errors may occur (human error analysis and accounting), and improve human reliability in performing tasks by reducing the possibility of errors (human error reduction). Most HRA methods assume that human error can be conceptualized to assess the probability of human error. As a result, there has been much discussion to collect data or databases that can be used as a basis for assessing the probability of human error. However, this approach remains seriously questioned by HRA scientists and practitioners (Ansori, 2013) & (Meister, 1964).

According to (Akbar, 2012) and (Hassan et al, 2020), there are nine Generic Task Types (GTTs) explained using the HEART approach, which identifies Human Error Potential (HEP), as well as 38 Error Producing Conditions (EPCs) that can affect performance reliability. This method is used to determine the generic task types and conditions that produce errors in a particular context.

Table 1. Generic Task in HEART method (Safitri, 2015)

Code	Generic Task	Human Unreliability Value	Range
(A)	Completely unfamiliar or unmastered work or tasks, performed at a pace without clear consequences	0,55	(0.35-0.97)
(B)	Changing or returning a system to a new or initial state with a single effort without supervision or procedures	0,26	(0.14-0.42)
(C)	The work is complex and requires a high level of understanding and skill.	0,16	(0.12-0.28)
(D)	Jobs that are fairly simple, done quickly or require little attention	0,09	(0.06-0.13)
(E)	Routine, skilled, low-skill jobs	0,02	(0.007-0.045)
(F)	Restore or shift the system to its initial or new condition by following a procedure, with some checks.	0,003	(0.0008-0.007)
(G)	Familiar or known work, well designed, routine tasks that occur several times per hour, performed to a very high standard by trained and experienced personnel with time to correct potential errors.	0,0004	(0.00008-0.09)
(H)	Respond to system commands correctly and there is even an additional automatic monitoring system that provides accurate interpretation.	0.00002	(0.000006-0.009)
(I)	There are no circumstances like the above	0.03	(0.008-0.11)

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Table 2. Error Producing Conditions in the HEART method (Safitri, 2015)

No	Error Producing Conditions (EPC)	Value of EPC
1	It is unusual for a situation to be potentially important, but only occurs occasionally or has recently occurred.	17
2	Limited or short time available to detect and correct errors	11
3	Low ratio between information reception (signal) to surrounding interference (noise)	10
4	There is an emphasis or rejection of information or advantages that are too easy to accept.	9
5	There is an emphasis or rejection of information or advantages that are too easy to accept.	8
6	A mismatch between a general operator model and what the designer envisions	8
7	There is no tool to reverse unwanted actions.	8
8	Excessive capacity in a channel, particularly one caused by information arriving simultaneously in a non-redundant manner	6
9	The need to abandon another technique by using the opposite philosophy	6
10	The need to transfer specific knowledge between tasks without causing harm	5,5
11	Doubts about the required performance standards	5
12	Putting aside information or features that are too easy to access	4
13	There is no comparison between perception and actual risk	4
14	There is no clear, direct, and timely confirmation of an intended action from the part of the system over which control is exercised.	4
15	Inexperienced (or new and qualified but not skilled) operators	3
16	Poor quality in information conveyed by procedures and human interactions	3
17	Little or no freedom in inspection or testing of outputs.	3
18	Conflict between short-term and long-term goals	2,5
19	There is no difference in the input information for checking accuracy.	2,5
20	Mismatch between the level of educational attainment of an individual and the requirements required in the task	2
21	The urge to use other, more dangerous procedures	2
22	Lack of time and opportunity to exercise the mind and body outside of work hours	2
23	Unreliable tool	1,6

24	The need to make a decision that is beyond the capacity or experience of the operator	1,6
25	Unclear allocation of functions and responsibilities	1,6
26	There are no real steps to stay on track during the activity (monitoring the process)	1,4
27	Dangers caused by limited physical abilities	1,4
28	Little or no significant role in the task	1,4
29	High levels of emotion and stress	1,3
30	Evidence of poor health among operators especially fever	1,2
31	Low level of worker discipline	1,2
32	Mismatch between display and procedure	1,2
33	Poor or unsupportive environmental conditions	1,15
34	High repetitive cycles of high work from low mental workload	1,1
35	Disruption of normal sleep cycle	1,1
36	Speed of tasks caused by the intervention of others	1,06
37	Adding team members that are not actually needed	1,03
38	Age of the operator performing the work	1,02

The steps for processing techniques using the HEART method are:
1. Identify tasks or types of work in the Operation Support Crew Unit.
2. Classify the Unreliability task items into Generic Tasks.
3. Determination of EPCs value.
4. Calculating the Assessed Effect Value: ((EPC – 1) x Poa) + 1.
5. Calculating HEP Value (*Human error Probabilityi*)

HEP = *Nominal Human Unreliability* x *Assessed Effect 1* x *Assessed Effect 2* x *Assessed Effect* n.

RESULTS

The respondents of this study were PT XYZ employees in the Operation Support Crew Unit with a total of 6 respondents.

Classify the types of tasks/jobs in general.
The analysis includes eight different generic task types (GTT) A to H, each with a pre-researched HEP (Wahyuni et al., 2020). These GTTs are distinguished based on characteristics or properties that describe the type of task being evaluated.

Table 3. Classification of Task / Job Types

No	Type of work	GTT	General Job Description	Nilai Human Unreliability (r)
1.	Pick up post-flight document packages from the dropbox at Terminal 3 of Soekarno-Hatta International Airport	(D)	Jobs that are fairly simple, done quickly or require little attention	0,09
2.	Separate AFL and non-AFL documents for domestic flights	(C)	Job that is complex and requires a high level of	0,16

	and validate the completeness of the documents		understanding and skill	
3.	Enter AFL data into the PFDS (Post Flight Document System) system	(C)	Job that is complex and requires a high level of understanding and skill	0,16
4.	Number the document packages and create a receipt record consisting of the date of receipt, package number and AFL number	(E)	Job that is routine, trained, and requires a low level of skill	0,02
5.	Store the physical AFL for 6 months according to the chronology of the aircraft registration	(E)	Job that is routine, trained, and requires a low level of skill	0,02
6.	Store non-AFL document packages for 3 months in order according to the date of receipt and package numbering	(E)	Job that is routine, trained, and requires a low level of skill	0,02
7.	Upload AFL documents into the DRMS (Documentation and Record Management System) system before being sent to the Central Archives	(C)	Job that is complex and requires a high level of understanding and skill	0,1
8.	Move documents that have expired their retention period to the Central Archives and then store them for 2 years	(E)	Job that is routine, trained, and requires a low level of skill	0,02
9.	Coordinate with the DS unit regarding the destruction of documents that have passed the 2-year retention period or there is a request for central archive documents	(F)	Restore or shift the system to an initial or new state by following a procedure, with some checks	0,003
10.	Serve requests for physical and/or softcopy documents for the benefit of CORSIA or other emission verification investigation/audit/analysis	(D)	Job that is fairly simple, done quickly or requires little attention	0,09

Identify error conditions
Expert analysis is needed to identify Error Producing Condition (EPC). These EPCs must be distinguished from those included in the GTT and should have clear characteristics. Based on (Akbar, 2012), there are 38 EPCs that can potentially affect the reliability of the work. This factor indicates the maximum estimate of the change in unreliability value from good to bad. When this condition does not affect reliability, the factor will be calculated as greater than 1.

Table 4. Determination of Error Conditions and Error Proportions

Task Type	Type of work	Field Conditions That Cause Errors (Error Producing Conditions/ Epcs)	Total HEART Effect (E)	Assessed Pro portion Of Affect (P)	Assessed Effect

1	Pick up post-flight document packages from the drop box at Terminal 3 of Soekarno-Hatta International Airport	(31)	Low level of worker discipline	1,2	0,9	1,36
		(27)	Hazards caused by limited physical abilities	1,4	0,9	1,18
2	Separate AFL and non-AFL documents for domestic flights and validate the completeness of the documents	(2)	Limited or short time available to detect and correct errors	11	0,5	6
		(15)	Inexperienced (or new and qualified but not expert) operators	3	0,5	2
		(29)	High levels of emotion and stress	1,3	0,5	1,15
		(36)	Task speed caused by interference from others	1,06	0,5	1,03
		(38)	Age of the operator performing the work	1,02	0,5	1,01
3	Enter AFL data into the PFDS (Post Flight Document System) system	(15)	Inexperienced (or new and qualified but not expert) operators	3	0,5	2
		(2)	Limited or short time available to detect and correct errors	11	0,5	6
		(19)	No differentiation of information input for accuracy checking	2,5	0,5	1,75
		(23)	Unreliable tools	1,61	0,5	1,305
		(33)	Poor or unsupportive environmental conditions	1,15	0,5	1,075
		(38)	Age of the operator	1,02	0,5	1,01

			performing the work			
4	Number the document packages and create a receipt record consisting of the date of receipt, package number and AFL number	(19)	No differentiation of input information for accuracy checking	2,5	0,2	1,3
		(28)	Little or no significant role in the task	1,4	0,3	1,12
5	Store the physical AFL for 6 months according to the chronology of the aircraft registration	(15)	Inexperienced (or new and qualified but not expert) operators	3	0,9	2,8
		(31)	Low level of worker discipline	1,2	0,9	1,18
6	Store non-AFL document packages for 3 months in order according to the date of receipt and package numbering	(15)	Inexperienced (or new and qualified but not skilled) operators	3	0,9	2,8
		(31)	Low worker discipline	1,2	0,9	1,18
7	Upload AFL documents into the DRMS (Documentation and Record Management System) system before being sent to the Central Archives	(15)	Inexperienced (or new and qualified but not skilled) operators	3	0,8	2
		(17)	Little or no freedom in checking or testing outputs	3	0,8	2,6
		(23)	Unreliable equipment	1,6	0,5	1,3
		(31)	Low worker discipline	1,2	0,8	1,16
8	Move documents that have expired their retention period to the Central Archives and then store them for 2 years	(27)	Hazards caused by limited physical abilities	1,4	0,8	1,32
		(33)	Poor or unsupportive environmental conditions	1,15	0,8	1,12
		(35)	Disruption of normal sleep cycles	1,1	0,8	1,08
		(38)	Age of operators	1,02	0,8	1,016

			performing the work			
9	Coordinate with the DS unit regarding the destruction of documents that have passed the 2-year retention period or there is a request for central archive documents	(25)	Unclear allocation of functions and responsibilities	1,6	0,9	1,54
		(26)	No real steps to stay on track during the activity (monitoring the process)	1,4	0,9	1,36
10	Serve requests for physical and/or softcopy documents for the purposes of investigation/audit/emission verification analysis CORSIA or others	(2)	Limited or short time available to detect and correct errors	11	0,9	10
		(32)	Mismatch between displays and procedures	1,2	0,6	1,12

Determining HEP (Human error Probability)

Determination of HEP can be done by estimating the level of unreliability of a task performed by the operator. The first step is to identify the task in its general form (generic task) related to the situation faced. The second step is to identify the conditions that can cause errors (EPC) that have a correlation with the overall HEART impact (total HEART effect) of each EPC. Furthermore, an impact proportion assessment (APOA) is carried out by determining the P value for each error (EPC) that affects the implementation of the task by the operator.

Table 5. Determining HEP

Task Step	GTT	Calculation					HEP
		EPC	EPC Value	Proportion	Assessed Effect	GTT Value	
1	D	27	1,4	0,9	1,36	0,09	0,1444
		31	1,2	0,9	1,18	0,09	
2	C	15	3	0,5	2	0,16	2,2969
		2	11	0,5	6	0,16	
		29	1,3	0,5	1,15	0,16	
		36	1,06	0,5	1,03	0,16	
		38	1,02	0,8	1,016	0,16	
3	C	15	3	0,5	2	0,16	4,7608
		2	11	0,5	6	0,16	
		19	2,5	0,5	1,75	0,16	
		23	1,61	0,5	1,305	0,16	
		33	1,15	5	1,075	0,16	
		38	1,02	0,8	1,016	0,16	
4	E	19	2,5	0,2	1,3	0,02	0,0291
		28	1,4	0,3	1,12	0,02	

5	E	15	3	0,9	2,8	0,02	0,0661
		31	1,2	0,9	1,18	0,02	
6	E	15	3	0,9	2,8	0,02	0,0661
		31	1,2	0,9	1,18	0,02	
7	C	15	3	0,5	2	0,1	0,7842
		17	3	0,8	2,6	0,1	
		23	1,6	0,5	1,3	0,1	
		31	1,2	0,8	1,16	0,1	
8	E	27	1,4	0,8	1,32	0,02	0,0324
		33	1,15	0,8	1,12	0,02	
		35	1,15	0,8	1,08	0,02	
		38	1,02	0,8	1,016	0,02	
9	F	25	1,6	0,9	1,54	0,03	0,0628
		26	1,4	0,9	1,36	0,03	
10	D	2	11	0,9	10	0,09	1,008
		32	1,2	0,9	1,12	0,09	

DISCUSSION

Based on the HEP evaluation using the HEART method, it was found that the highest HEP occurred in tasks that had a potential for human error of 4.7607966, while the lowest HEP was recorded at 0.02912. The higher the HEP value of a task, the more likely the task is to cause human error. The task with the highest HEP is "Entering AFL data into the Post Flight Document System (PFDS)". This task has a high HEP because there are six EPCs, including the need to move the task to the next step without causing losses, which can result in errors due to time pressure and lack of focus.

In addition, the lack of worker experience can also increase the risk of errors. (Nurhayati, 2017) emphasized that a person's experience in recognizing potential hazards in the workplace will increase with age and work experience, thus helping to reduce the possibility of errors.

To minimize human error, we must know the tasks in the Operation Support Crew Unit, then identify possible human errors and assess human error probability. Then we are able to prevent or minimize human error in the Operation Support Crew Unit based on EPC, human error probability, and observation results in the PT XYZ Operation Support Crew Unit.

The results of the study describe that the conditions that can allow human error (EPC) in the Operation Support Crew Unit are "stress". Prevention of stress while on duty can be done by minimizing sources of stress, usually originating from the work environment and maintain good relationship between leader and staff (Artha et al, 2023). The results of the observation describe that the cause of stress is an uncomfortable work environment. Possible prevention is to rearrange the work space or increase the number of staff. In some situations, incentives, motivation and discipline together or partially had a significant and positive effect on employee performance (Riwukore, 2021)

Unskilled operators or workers can increase the risk of errors. To overcome this problem, one step that can be taken is to provide training to Unit Operation Support Crew staff on the use of tools, machines, and work procedures in accordance with the established Standard Operating Procedures (SOP) by improve staff skills through regular training

(Aeisyah, 2024). In addition, outdated equipment can also be a driving factor for human error. To overcome this, companies need to replace outdated equipment. In addition, routine maintenance and periodic inspections of machines and equipment in the Unit Operation Support Crew are also very important to ensure optimal performance and reduce the risk of errors.

CONCLUSION

Based on the results of the analysis and discussion, it can be concluded that the identification of human error using the HEART method reveals varying levels of error probability across different tasks. The task with the highest potential for error is entering data into the system, with a *Human Error Probability* (HEP) value of 4.7607966. In contrast, the lowest potential for error is found in numbering document packages and creating receipt records, with an HEP value of 0.02912.

Further analysis indicates that the main causes of human error include unskilled staff, an uncomfortable work environment, and inadequate equipment. Several strategic measures can be implemented to minimize these errors. First, providing training for unskilled workers on the use of tools, machines, and work procedures in accordance with established SOPs. Second, rearranging the workspace and work environment to improve comfort and efficiency. Third, replacing outdated equipment and ensuring regular inspection and maintenance of tools and machines used.

These efforts are expected to create a safer, more efficient, and error-minimized work environment, ultimately enhancing the company's overall performance.

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