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Research Article

Analysis of the Mental Workload of Police Helicopter Pilots on Police Operations Assignment in Papua: NASA-TLX Method Approach

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Abstract.

Police helicopter pilots play a critical role in the success of various operational assignments. These officers, under the Directorate of Air Police Corps (Baharkam Polri), are trained aviators responsible for flying helicopters and other aircraft under specific operational requirements. The Directorate of Air Police is tasked with a range of duties including early detection, air escort, air ambulance, pursuit, leadership transportation support, and other mission-critical operations. This study aims to analyze the mental workload of police helicopter pilots deployed in Papua, where they face significant challenges such as extreme weather conditions, difficult terrain, and the constant threat of attacks from Armed Criminal Groups (KKB). A quantitative method was employed using the NASA-TLX, which evaluates six dimensions: Physical Demand, Temporal Demand, Mental Demand, Effort, Performance, and Frustration. Eight Bell 412 participated in the study by completing the NASA-TLX questionnaire. Results showed an average workload score (80–100), indicating a very high mental burden. These findings suggest the need for leadership within the Indonesian National Police to prioritize mental health by implementing regular rotation schedules to mitigate stress and fatigue among aviation personnel.

Keywords: mental workload, Indonesia National Police Helicopter Pilot, NASA-TLX

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1. INTRODUCTION

Flights in the Papua area are specific and special flights with terrain conditions in the form of mountains, especially for the Central Papua region. The position of the destination area is located between the mountains with various space limitations both when you want to land and when you are about to fly. Limitations in the operation of aircraft and helicopters in the field are also constrained by the dimensions of the runway or runway, the runway surface, elevation or height from sea level and the gradient of the slope of the runway itself. Another factor that is very influential in flying in mountainous areas is weather conditions. Weather conditions that are difficult to predict, change quickly and lack of information pose the toughest challenges in aviation. In addition to the above, another challenge is the performance of the aircraft or helicopter when flying which decreases when flying at high altitudes.

Various factors that affect flights in the mountains have a direct impact on aviators who fly in the mountainous area. Data on various causes of incidents or accidents that befall aircraft or helicopters, namely flights in mountainous areas, are known as Controlled Flight into Terrain (CFIT), as shown in the following image below:

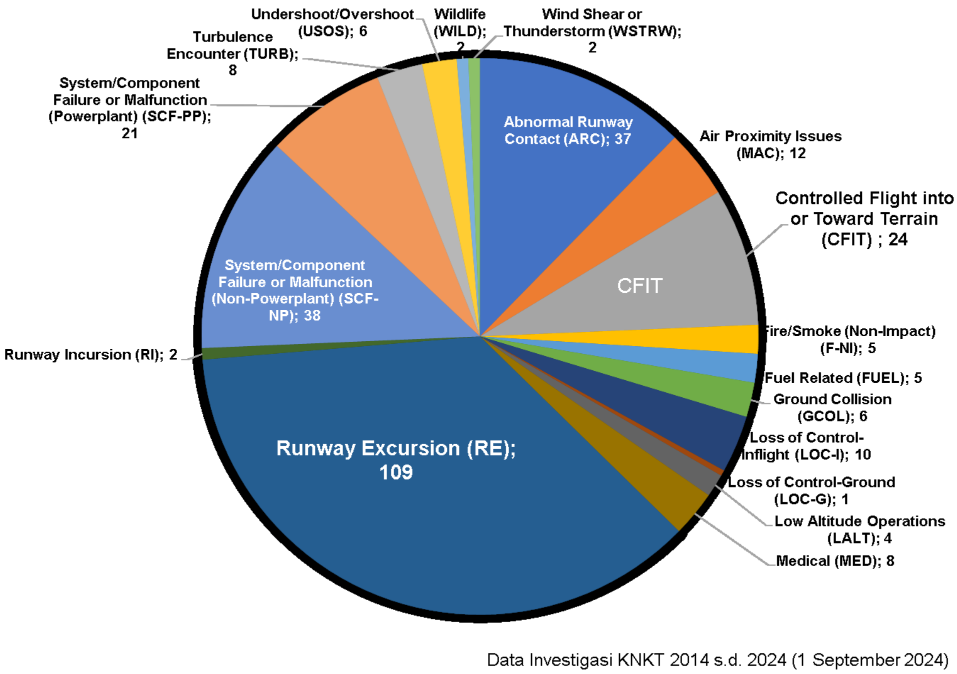


Figure 1: KNKT Investigation Data on the causes of aircraft accidents in 2014-2024.

Investigation data from the National Transportation Safety Committee (KNKT) presented in the Focus Group Discussion related to aircraft or helicopter accidents due to flights in mountainous areas as many as 24 incidents. When viewed from 2014 to 2024, it is divided into Flight Operator 121 or scheduled operators, operator 135 or charter operators, operator 141 or flight schools and operator 91 or general aviation operators.

From the data above, the operator of flight 135 or charter experienced 19 incidents. Meanwhile, scheduled flight operators, general aviation operators and flight schools have experienced few incidents due to the location of their flight areas that do not reach inland areas, where the locations are located at the foot of mountains and valleys.

Table 1: Areas with the most incidences due to CFIT.

Jawa	Kalimantan	Sulawesi	Maluku	Papua
2	2	2	2	16

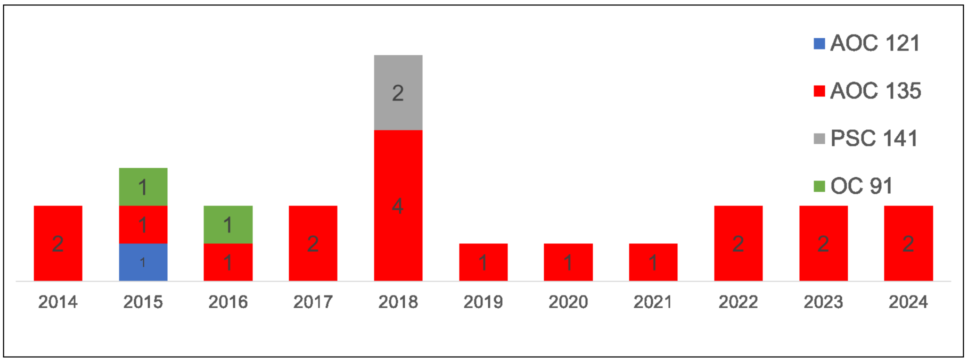


Figure 2: Airline operators who have been involved in accidents.

Incidents or accidents caused by CFIT, a total of 16 incidents occurred in Papua. This requires special attention from all aviators on duty in Papua. Humans, in this case, aviators are the main component in aviation safety. In addition, the main components in other aviation safety come from other humans besides the aviator, rules and Standard Operating Procedures, aircraft or aircraft components, and the aviation environment itself.

The assignment of the Indonesia National Police helicopter crew and helicopters in Papua is personal and helicopter support based on the orders of the Indonesia National Police leader contained in the 2024 Cartenz Peace Operation Plan regarding law enforcement against the interference of armed criminal groups (KKB) and political criminal groups in the jurisdiction of the Papua Regional Police with priority targets in Central Papua Province and Mountainous Papua Province. Previous assignments have also been carried out, namely by carrying out Nemangkawi operations from 2020 to 2023 as well as other police operations. Flights in the Papua area with topography and weather conditions as well as threats from armed criminal groups in the form of shootings, can cause a mental workload for the National Police aviators themselves.

Therefore, researchers are interested in conducting research on the mental workload of Indonesia National Police helicopter pilots by measuring through the NASA-TLX (National Aeronautics and Space Administration-Task Load Index) method which will later produce the output of the mental workload conditions of the aviators and provide suggestions or recommendations to the leader regarding the assignment of National Police helicopter pilots on duty in Papua.

2. THEORETICAL STUDY

2.1. Mental Workload

Jex H.R stated that mental workload is the difference between the workload demands of a task compared to the maximum capacity of a person's mental load in a motivated state [1]. Meanwhile, Hancock and Mesakhti (1988) stated that mental workload is an evaluation of the operator's burden margin that needs to be considered (between motivational capacity and current task demand) when receiving sufficient work performance in the context of the relevant mission [2]. According to Wickens and Hollands (2000), workload can be divided into three contexts in the form of prediction of workload, assessment of workload, and workload experienced by the worker himself [3] Another opinion states that mental workload is the degree of process capacity issued during the display of tasks and the concept of mental workload that arises due to the information process [4]. From the various definitions that exist, it is generally stated that mental workload is based on the difference in the number of resources available with the many demands of the tasks that must be done [5].

Mental workload is related to performance, where the appropriate workload will be able to produce optimal performance. High workloads can lead to increased effort or in other words low performance caused by workloads that exceed available resources [6]. Wickens and Hollands argue that the factors that have a significant impact on the onset of mental workload are attention to two or more jobs, high levels of alertness and difficulty understanding the language used [3]

Excessive mental workload has an impact on physical symptoms, mental symptoms and social or behavioral symptoms. Physical symptoms that can be seen are reduced appetite, difficulty sleeping, pain in the head and abdomen. Meanwhile, mental symptoms can be seen from difficulty concentrating, anxiety, easy emotions, and easy forgetfulness. Social symptoms can be seen from starting to withdraw from associations, avoiding social. Stoner (1986) stated that excessive mental workload can cause stress at work, which affects motivation and results in performance degradation.

2.2. NASA-TLX

The NASA-TLX method was developed by Sandra G. Hart of the NASA-Ames Research Center and Lowell E. Staveland of San Jose State University in 1981. This method uses a questionnaire developed based on the sensitivity of workload measurement [7]. The NASA-TLX method was originally a subjective measurement with nine factors, consisting of task difficulty, time pressure, type of activity, physical effort, mental effort, performance, frustration, stress and fatigue. However, it was then simplified into six factors in the form of Mental Demand (MD), Physical Demand (PD), Temporal Demand (TD), Performance (P), Effort (EF), and Frustration Level (FR) [8]. NASA-TLX is also a subjective workload assessment based on participant performance, in performing experimental tasks to assess workload [9]. NASA TLX has also been used to estimate the workload of an individual or entire personnel working in conditions such as automation, command, control, communications workstations, surveillance and process environments, aircraft cockpits, as well as simulation technology and laboratory tests. ([10];[11]; [12]; [13]; [14]; [15]).

3. METHODS

The method used in this study is to observe and distribute questionnaires to Bell 412 helicopter pilots who are assigned in Papua. Data collection was carried out by collecting back the NASA-TLX questionnaire that had been filled out by the respondents, in this case the Bell 412 type helicopter pilots of the National Police totaling eight people and conducting flight assignments in the Papua area. The data that has been collected is then processed by measuring values in six stages on NASA-TLX, namely by giving weights, giving ratings, calculating product values, calculating weighted workloads, calculating the average weighted workload, and interpreting the values of the results of calculating the average weighted workload. The next step is to conduct a uniformity test and data adequacy test. The value obtained from data processing is then analyzed to provide suggestions and recommendations to the leadership of the National Police to provide guidance and maintenance of personnel, especially the National Police helicopter pilots who are on duty in the Papua area.

3.1. Measurement Stages

Hancock and Meshkati (1988) stated that there are six stages in the NASA-TLX method, including [16]:

3.1.1. Weighting

According to Hancock & Meshkati (1988), in the measurement with NASA-TLX there are six indicators of concern, including [16]:

TABLE 2: Weighting.

NASA_TLX Indicator		Scale
Mental Demand (MD)	How mentally demanding is your assignment to Papuan blood? (in seeking, remembering, seeing, perceptual)	Very low - very high
Physical Demand (PD).	How physically demanding are you in your assignment in the Papua area? (a lot of physical activity, e.g., pushing, running)	Very low - very high
Temporal Demand (TD).	How much demand or pressure is there on time so that it seems rushed to complete the flight mission? (relaxed, not tired or tired quickly)	Very low - very high
Performance (OP).	What is your level of success in achieving the aviation mission in Papua? (success rate and satisfaction rate)	Perfect - Failed
Effort (EF)	How much effort do you put into achieving your level of performance?	Very low - very high
Frustration Level (FR)	How insecure, desperate, upset, stressed, and upset are you in your assignment in Papua? (stress level)	Very low - very high

Respondents were asked to choose one of the two indicators that they felt were more dominant that could cause a mental workload towards the job. The questionnaire was given in pairs of 15 pairs of mental load indicators to calculate the number of tally of each indicator that was felt to be very influential. The number of tally is the weight for each mental load indicator.

	MD	PD	TD	OP	EF	FR
MD						
PD						
TD						
OP						
EF						
FR						

Figure 3: Dominant indicators.

Results of Questionnaire Weighting Data:

TABLE 3: Mental Load Indicator.

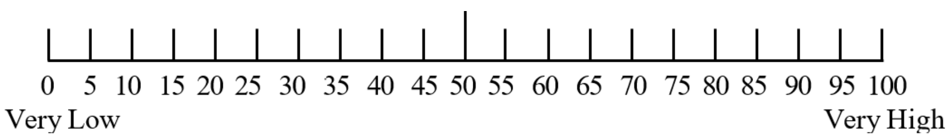
No.	Mental Load Indicator		
1.	Mental Demand (MD)	X	Physical Demand (PD)
2.	Mental Demand (MD)	X	Temporal Demand (TD)
3.	Mental Demand (MD)	X	Performance (OP)
4.	Mental Demand (MD)	X	Effort (EF)
5.	Mental Demand (MD)	X	Frustration Level (FR)
6.	Physical Demand (PD)	X	Temporal Demand (TD)
7.	Physical Demand (PD)	X	Performance (OP)
8.	Physical Demand (PD)	X	Effort (EF)
9.	Physical Demand (PD)	X	Frustration Level (FR)
10.	Temporal Demand (PD).	X	Performance (OP)
11.	Temporal Demand (TD).	X	Effort (EF)
12.	Temporal Demand (TD)	X	Frustration Level (FR)
13.	Performance (OP)	X	Effort (EF)
14.	Performance (OP)	X	Frustration Level (FR)
15.	Effort (EF)	X	Frustration Level (FR)

The data obtained from the respondents was then tabulated by giving weights. The weighting results of each indicator are then added so that the total weighting value of each subject is obtained with a total of 15.

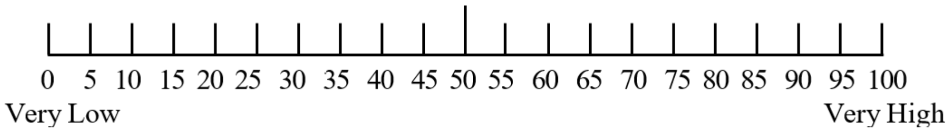
3.1.2. Rating Value

Respondents were asked to provide rating values for six indicators of mental workload. The giving of this rating value depends on the individual or respondent who experiences these six indicators. Rating scale from 0 to 100.

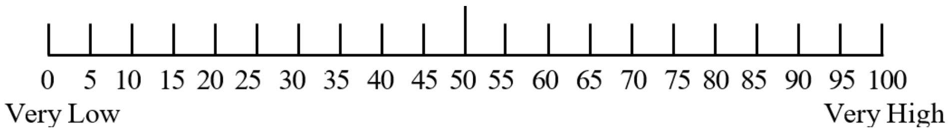
1. Mental Demand (MD) How big is your Mental Demand in assignments in the Papua area?



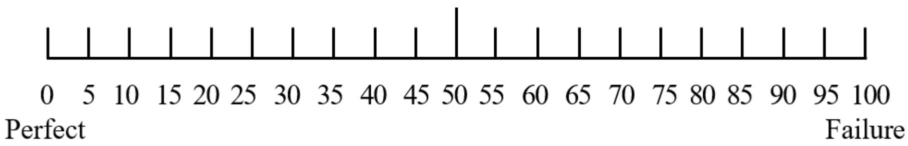
2. Physical Demand (PD). How big is your Physical Demand in your assignment in the Papua area?



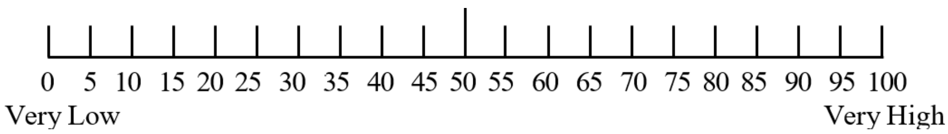
3. Temporal Demand (TD). How fast or rushed is it to complete a flight mission?



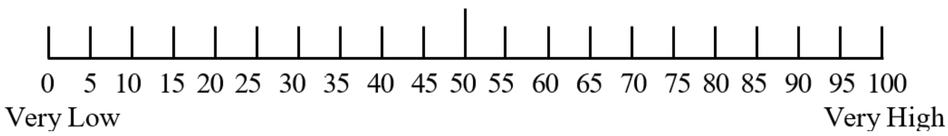
4. Performance (OP). What is your level of success in achieving the aviation mission in Papua?



5. Effort (EF). How much effort do you put into achieving your level of performance?



6. Frustration Level (FR) How insecure, desperate, upset, stressed, and upset are you in your assignment in Papua?



3.1.3. Product Value Calculation

The product value is the result of multiplying the weight of the indicator with the rating value which produces six indicators of product value for MD, PD, TD, CE, FR, EF.

Product = Rating Value X Weight Factor (1)

3.1.4. Weighted Workload Calculation

Weighted Workload (WWL) is the result of the sum of the six product values.

WWL= $\sum$Product (2)

3.1.5. Average WWL calculation

Average Weighted Workload (WWL) It is obtained by dividing the Weighted Workload (WWL) by the number of indicator weights of 15.

Averaged Weighted Workload (WWL)= $\frac{\sum Product}{15}$ (3)

3.1.6. Value interpretation

The interpretation of the value is based on the NASA-TLX theory by Hart and Staveland (1981), with the following description:

TABLE 4: Value Interpretation.

Workload Group	Value
Low	0 – 9
Keep	10 – 29
Rather High	30 – 49
High	50 – 79
Very High	80 - 100

4. RESULTS AND DISCUSSION

The results of the data calculation using the six stages of NASA-TLX were then recapitated to make it easier for leaders to see personnel who need personnel coaching and maintenance to ensure the creation of safety in flight as follows.

4.1. Weighting

The data obtained from the respondents was then tabulated by giving weights. The weighting results of each indicator are then added so that the total weighting value of each subject is obtained with a total of 15.

TABLE 5: Weighting.

Research Subject	Position	Flight Hours	Indicator						Total
			MD	PD	TD	OP	EF	FR	
Janji T	Pilot	5150	3	0	2	4	3	3	15
Rahmat W	Pilot	2800	5	0	1	2	3	4	15
Deden P	Pilot	1700	2	1	3	5	4	0	15
M Syaban	Co Pilot	350	2	0	4	3	3	3	15
Wiwit B	Co Pilot	150	3	0	2	3	2	5	15
Riki HendraG	Co Pilot	150	4	1	0	4	4	2	15
Kaisal	Co Pilot	756	2	1	3	5	4	0	15
Liber S	Co Pilot	640	5	1	4	2	3	0	15

4.2. Rating

The rating value was obtained from respondents who filled out a questionnaire of six indicators and was in accordance with what the aviators themselves felt or experienced and influenced and dominated their work. The results of the rating are then tabulated as follows.

TABLE 6: Rating.

Research Subject	Position	Flight Hours	Indicator					
			MD	PD	TD	OP	EF	FR
Janji T	Pilot	5150	100	50	80	90	100	90
Rahmat W	Pilot	2800	100	90	80	90	100	100
Deden P	Pilot	1700	100	90	100	90	90	100
M Syaban	Co Pilot	350	100	90	90	80	90	80
Wiwit B	Co Pilot	150	100	70	70	80	80	100
Riki HendraG	Co Pilot	150	85	75	75	90	95	90
Kaisal	Co Pilot	756	85	95	75	90	90	60
Liber S	Co Pilot	640	90	80	80	75	90	20

4.3. Product Value Calculation

The product value is the result of multiplying the weight of the indicator with the rating value which produces six indicators of product value for MD, PD, TD, CE, FR, EF.

TABLE 7: Weighting.

Research Subject	Position	Flight Hours	Indicator						Total
			MD	PD	TD	OP	EF	FR	
Janji T	Pilot	5150	3	0	2	4	3	3	15
Rahmat W	Pilot	2800	5	0	1	2	3	4	15
Deden P	Pilot	1700	2	1	3	5	4	0	15
M Syaban	Co Pilot	350	2	0	4	3	3	3	15
Wiwit B	Co Pilot	150	3	0	2	3	2	5	15
Riki HendraG	Co Pilot	150	4	1	0	4	4	2	15
Kaisal	Co Pilot	756	2	1	3	5	4	0	15
Liber S	Co Pilot	640	5	1	4	2	3	0	15

TABLE 8: Rating.

Research Subject	Position	Flight Hours	Indicator					
			MD	PD	TD	OP	EF	FR
Janji T	Pilot	5150	100	50	80	90	100	90
Rahmat W	Pilot	2800	100	90	80	90	100	100
Deden P	Pilot	1700	100	90	100	90	90	100
M Syaban	Co Pilot	350	100	90	90	80	90	80
Wiwit B	Co Pilot	150	100	70	70	80	80	100
Riki HendraG	Co Pilot	150	85	75	75	90	95	90
Kaisal	Co Pilot	756	85	95	75	90	90	60
Liber S	Co Pilot	640	90	80	80	75	90	20

The results of the multiplication of the weight value and rating value are shown as shown in the following Table 9 below:

TABLE 9: Results of Multiplication of Weight Value and Rating Value.

Research Subject	Position	Flight Hours	Indicator					
			MD	PD	TD	OP	EF	FR
Janji T	Pilot	5150	300	0	160	360	300	270
Rahmat W	Pilot	2800	500	0	80	180	300	400
Deden P	Pilot	1700	200	90	300	450	360	0
M Syaban	Co Pilot	350	200	0	360	240	270	240
Wiwit B	Co Pilot	150	300	0	140	240	160	500
Riki HendraG	Co Pilot	150	340	75	0	360	380	180
Kaisal	Co Pilot	756	170	95	225	450	360	0
Liber S	Co Pilot	640	450	80	320	150	270	0

4.4. Weighted Workload Calculation

Weighted Workload (WWL) is the result of the sum of the six product values, so that the overall value of the indicator from each aviator is obtained.

WWL= $\sum$Product (4)

TABLE 10: WWL Calculation Results.

Research Subject	Position	Flight Hours	Indicator						WWL
			MD	PD	TD	OP	EF	FR	
Janji T	Pilot	5150	300	0	160	360	300	270	1390
Rahmat W	Pilot	2800	500	0	80	180	300	400	1460
Deden P	Pilot	1700	200	90	300	450	360	0	1400
M Syaban	Co Pilot	350	200	0	360	240	270	240	1310
Wiwit B	Co Pilot	150	300	0	140	240	160	500	1340
Riki HendraG	Co Pilot	150	340	75	0	360	380	180	1335
Kaisal	Co Pilot	756	170	95	225	450	360	0	1300
Liber S	Co Pilot	640	450	80	320	150	270	0	1270

4.5. WWL Average Calculation

The average Weighted Workload (WWL) is obtained by dividing the Weighted Workload (WWL) by the number of indicator weights of 15.

Average Weighted Workload (WWL) = $\frac{\sum Product}{15}$ (5)

TABLE 11: WWL Average Calculation Results.

Research Subject	Position	Flight Hours	Indicator						WWL	Average WWL
			MD	PD	TD	OP	EF	FR		
Janji T	Pilot	5150	300	0	160	360	300	270	1390	92,66666667
Rahmat W	Pilot	2800	500	0	80	180	300	400	1460	97,33333333
Deden P	Pilot	1700	200	90	300	450	360	0	1400	93,33333333
M Syaban	Co Pilot	350	200	0	360	240	270	240	1310	87,33333333
Wiwit B	Co Pilot	150	300	0	140	240	160	500	1340	89,33333333
Riki HendraG	Co Pilot	150	340	75	0	360	380	180	1335	89
Kaisal	Co Pilot	756	170	95	225	450	360	0	1300	86,66666667
Liber S	Co Pilot	640	450	80	320	150	270	0	1270	84,66666667

4.6. Value Interpretation

According to Hart and Staveland (1981) based on the NASA-TLX theory, workload scores/scores are divided into five levels, including:

TABLE 12: Value Interpretation.

Workload Group	Value
Low	0 – 9
Keep	10 – 29
Rather High	30 – 49
High	50 – 79
Very High	80 - 100

TABLE 13: Recapitulation of the value of the mental workload of the aviator.

Research Subject	Position	Flight Hours	Indicator						WWL	Average WWL
			MD	PD	TD	OP	EF	FR		
Janji T	Pilot	5150	300	0	160	360	300	270	1390	92,66666667
Rahmat W	Pilot	2800	500	0	80	180	300	400	1460	97,33333333
Deden P	Pilot	1700	200	90	300	450	360	0	1400	93,33333333
M Syaban	Co Pilot	350	200	0	360	240	270	240	1310	87,33333333
Wiwit B	Co Pilot	150	300	0	140	240	160	500	1340	89,33333333
Riki HendraG	Co Pilot	150	340	75	0	360	380	180	1335	89
Kaisal	Co Pilot	756	170	95	225	450	360	0	1300	86,66666667
Liber S	Co Pilot	640	450	80	320	150	270	0	1270	84,66666667
Total			2460	340	1585	2430	2400	1590		
Percentage			22,76%	3,14%	14,66%	22,48%	22,21%	14,71%		

The output produced in the NASA-TLX measurement is the level of mental workload experienced by the National Police helicopter pilots. This result can be used by leaders to provide recommendations for workloads that are considered very high and can provide the workload to other helicopter pilots with less workloads.

4.7. Analysis of NASA-TLX processing results

The results obtained in the calculation using the NASA TLX method, then recapitulation is carried out as shown in Table 13. The average WWL for each helicopter pilot is then classified according to the interpretation of values as shown in Table 12. The results of the score recapitulation show that eight Police helicopter pilots are at a score of 80 to 100. This means that the work they do has a very high mental workload. A very high mental workload can affect the performance of an aviator himself. Symptoms that arise in an aviator are anxiety, lack of focus, rapid boredom, and irregular heartbeat. This will add to the stress of flying a rescue mission with unfavorable weather and accompanied by shelling from both the government and armed criminal groups.

In three aviators with the position of pilot or captain, it shows a mental workload above 92 because the responsibility of a captain or pilot is greater for the safety of passengers, aircraft, cargo and the crew itself. Meanwhile, five aviators with copilot status showed a score below 90. This indicates a lower level of responsibility than captains or pilots, but they still remain at very high values. The profession as a National Police helicopter pilot is not only an aviator who is required in terms of flight safety but also as a protector, protector and servant of the community, namely by creating an orderly and safe condition situation. If sorted by WWL value from high to low, then Rahmat Widodo has a very high mental workload (97.33), followed by Deden P (93.33), Janji T (92.66), Wiwit (89.33), Riki (89), Shaban (87.33), Kaisal (86.66) and the lowest is Liber (84.66).

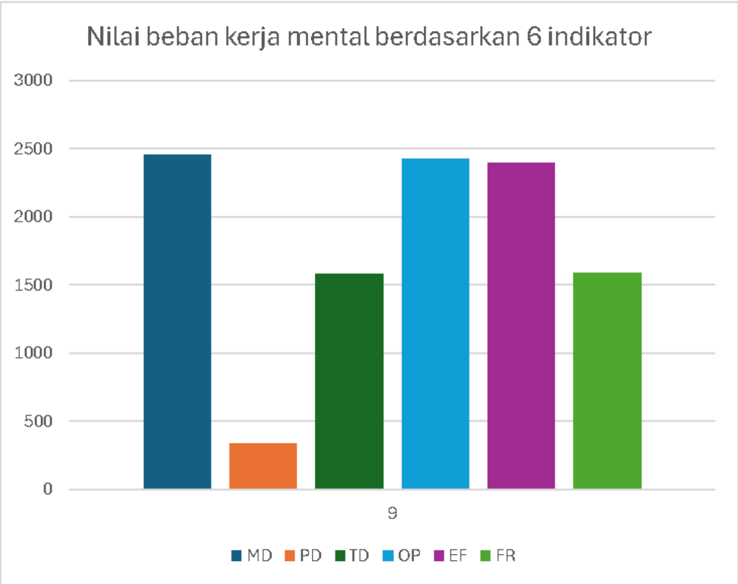


Figure 4: The value of the mental workload of the aviator based on six indicators.

From Figure 4 above, information is obtained about the values of six indicators that are very influential and if sorted the indicators that are very influential in the mental workload of the National Police helicopter aviators are Mental Demands (MD) of 2460 or 22.76%, Own Performance (OP) of 2430 or 22.48%, Effort (EF) of 2400 or 22.21%, Frustation Level (FR) of 1590 or 14.71%, Temporal Demands (TD) of 1585 or 14.66%, Physical Demands (PD) of 340 or 3.1%.

Uniformity Test Analysis

$\overline{X} = \frac{\sum Xi}{N}$ (6)

$\sigma_x = \sqrt{\frac{\sum \left(Xi - \overline{X} \right)^2}{N-1}}$ (7)

BKA = $\overline{X} + 3\sigma_x$ (8)

BKA = $\overline{X} - 3\sigma_x$ (9)

Keterangan:

$\overline{X}$ = Mean

σ_x = Standard Deviation

N = Number of data

BKA = Upper Control Limit

BKB = Bottom Control Limit

TABLE 14:

	Xi	$\overline{X}$	Xi - $\overline{X}$	(Xi - $\overline{X}$)^2	BKA	BKB
	92,66667	90,04167	2,625004	6,8906447	102,4679	77,61546
	97,33333	90,04167	7,291664	53,16836	102,4679	77,61546
	93,33333	90,04167	3,291664	10,83505	102,4679	77,61546
	87,33333	90,04167	-2,70834	7,3350852	102,4679	77,61546
	89,33333	90,04167	-0,70834	0,5017402	102,4679	77,61546
	89	90,04167	-1,04167	1,0850686	102,4679	77,61546
	86,66667	90,04167	-3,375	11,3906	102,4679	77,61546
	84,66667	90,04167	-5,375	28,890585	102,4679	77,61546
sum	720,3333			120,09713		
SD	4,142069					

The values of the calculation results above are then made a graph or chart using the Excel application and the following image is obtained:

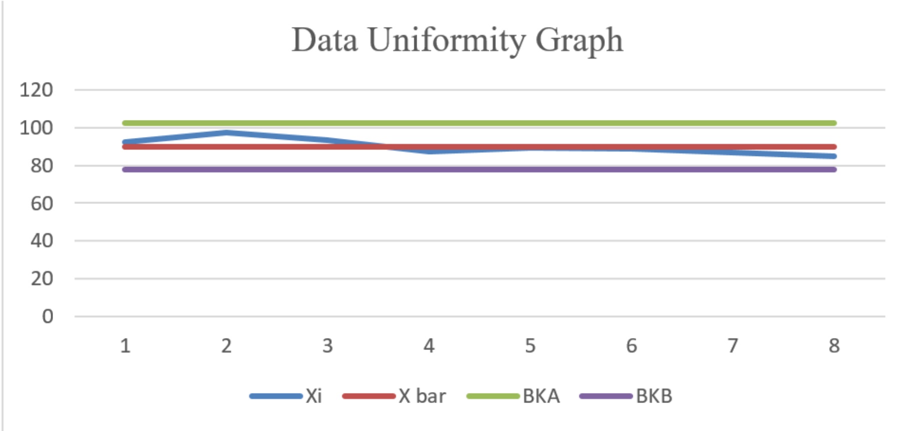


Figure 5: Data Uniformity Graph.

The graph mentioned above can also be obtained by using the SPSS application, namely by processing data from the WWL average, so that the following graph image is obtained below:

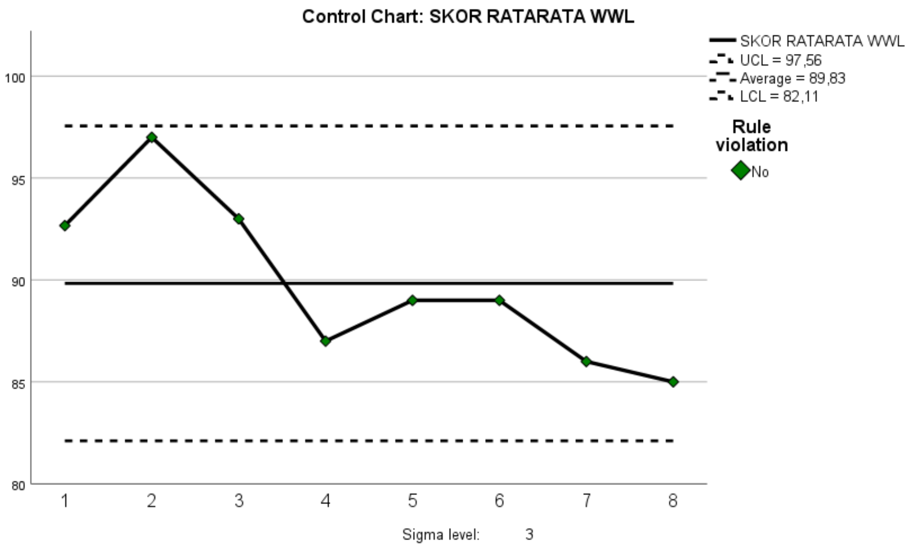


Figure 6: Average WWL scores.

In Figure 5 and Figure 6 above, it shows that the average Weighted Workload (WWL) score is between the upper control limit and the lower control limit so that the data from the eight Indonesia National Police helicopter pilots is considered uniform.

4.8. Data Adequacy Test Analysis

The data adequacy test in this study uses the following formula:

$$N' = \left[\frac{\frac{k}{s} \sqrt{N \sum x^2 - (\sum x)^2}}{\sum X} \right]^2 \quad (10)$$

Dengan:

K = Confidence level = 95% = 2

S = Degree of Accuracy = 5% = 0,05

N = Number of data = 8

N' = Numberof theoretical data

If N' < N, then the data is considered sufficient

If N' > N, then the data is considered insufficient/insufficient

TABLE 15: X and X2 values.

No.	**Xi**	**Xi^2**
1	92,66667	8587,111
2	97,33333	9473,778
3	93,33333	8711,111
4	87,33333	7627,111
5	89,33333	7980,444
6	89	7921
7	86,66667	7511,111
8	84,66667	7168,444
Sum	720,3333	64980,11

The values in Table 15 mentioned above are then entered into the formula and the calculation results are obtained as follows:

N' = 2,96262

N = 8

Because N' < N, the data from eight National Police helicopter pilots is considered sufficient for research.

5. CONCLUSION

5.1. Conclusions

1. The average WWL of each helicopter aviator is then classified according to the interpretation of the values as shown in Table 13. The results of the score recapitulation show that eight Police helicopter pilots are at a score of 80 to 100. This means that the work they do has a very high mental workload.
2. In three aviators with the position of pilot or captain, showing a mental workload above 92. This shows that the responsibility of a captain or pilot is greater for the safety of passengers, aircraft, cargo and the crew themselves. Meanwhile, five aviators with copilot status showed a score below 90. This indicates that the level of responsibility is lower than that of captains or pilots, but they still remain at a very high value.
3. Indonesia National Police helicopter pilot named Rahmat Widodo has a very high mental workload (97.33), followed by Deden P (93.33), Janji T (92.66), Wiwit (89.33), Riki (89), Shaban (87.33), Kaisal (86.66) and the lowest is Liber (84.66).
4. The indicators that greatly affect the mental workload of the National Police helicopter pilots are Mental Demands (MD of 22.76%, Own Performance (OP) of 2.48%, Effort (EF) of 22.21%, Frustation Level (FR) of 14.71%, Temporal Demands (TD) of 14.66%, Physical Demands (PD) of 3.1%.
5. The highest Mental Demands score shows that the profession as a National Police aviator requires a high level of concentration, focus on mission success and flight safety, be able to do two jobs at the same time, and be able to make the right and fast decisions.

5.2. Recommendations

To reduce the long-term impact on police helicopter pilots, namely by maintaining their mental health, it is important to implement the following strategic actions below:

1. The provision of material support in the form of pocket money is given on time and all the needs at the place of duty to be provided are very feasible. In addition, it is necessary to provide training on flights in mountainous areas, so that Police helicopter pilots have more readiness in their assignments.

2. The fulfillment of personal protective equipment in the form of body vests, helmets, and weapons to protect themselves from armed criminal groups. In addition, the helicopter must also be equipped with bulletproof protection on the bottom of the helicopter to anticipate shooting by armed criminal groups. The fulfillment of navigation equipment and weather radar is also an important thing that must be installed immediately in helicopters. In addition, the installation of Ground Proximity Warning System/GPWS and Traffic Collision Alert System/TCAS is the main requirement in flights in mountainous areas.

3. Flight conditions with all kinds of dangers and threats, so that they pose a very high mental workload, especially for pilots or flight captains. The current assignment is carried out with a duty period of a month or more, which is considered very long and can cause stress. It is expected that for the next assignment in the Papua area, for two weeks there will be a change of helicopter crew.

4. To supervise and motivate the helicopter crew on duty, to revive enthusiasm and improve work performance. Providing entertainment facilities to relieve stress, it can be in the form of karaoke as well as fitness facilities to prepare the physical condition of the National Police helicopter pilots who are in excellent condition and ready to carry out their duties. In addition, the placement of helicopter crews in a safe and comfortable place/home and their safety is guaranteed.

5. Revise the standard operating procedures, especially flight assignments in the Papua area to maintain crew safety and flight safety so that aviators can perform their duties well and focus on the mission and be able to make decisions quickly in accordance with applicable regulations.

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