Analysis Of Factors Causing Delay Maintenace In Completing Using Failure Mode Effect Analysis (FMEA) Method

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Abstract. Air transportation in Indonesia has experienced delays in completing maintenance based on a predetermined schedule. The TAT (Turn Around Time) indicator is used to measure the performance in completing the maintenance. This research aims to determine the factors that cause maintenance delays on the B737NG aircraft and minimize TAT delays. There are three main factors that cause the delays in completion of treatment, namely due to lack of manpower, the process of waiting for material supplies, and the length of time to process the findings. In order to strengthen the result of the analysis, this research uses the method with the support of FMEA (Failure Mode Effect Analysis) to develop a table for calculating the RPN values or risk priority scale. FMEA is a systematic method of identifying and preventing product and process problems before they occur. So, the calculation results show that the highest RPN value is not paying attention on the ratio of work to manpower, which gives an RPN value of 216. Then a solution is recommended to reduce the RPN to a value of 168 where the aim is to reduce the TAT delay in completing the maintenance of aircraft.

Keywords: Delay maintenance, Turn Around Time, FMEA, Aircraft B737NG

1. Introduction

PT XYZ one of the factors that can use cause flights not to be on time is the unavailability of aircraft on schedule that have been determined based on the Turn Around Time (TAT) indicator. TAT is the maintenance time interval required for a job a job to start entering the system until the process is complate, which shows a work cycle. On 2021 data from PT XYZ this analysis focus on the Boeing 737NG type because this type is the most popular type used in the world of aviation.It can be concluded that PT XYZ experienced an avarage delay of 10 days in completing C-check maintenance. Therefore, it is necessary to identify the causes of the problem and solutions to handle TAT delays in completing C-check maintenance on Boeing 737NG aircraft.

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2. Literature Review

2.1 Aircraft Maintenance

Maintenance- is an activity carried out with the aim of maintaining and/or returning an aircraft to a certain condition so that it can carry out its functions and meet certain performance standards. Performance standards are limits for determining the failure or functioning of a system. Based on the time the maintenance is carried out, aircraft maintenance can be devided into 2, namely corrective and preventive maintenance.[1]
This corrective maintenance is also carried out if no effective and efficient preventive maintenance is found for the consequences of non-safety failure. Preventive maintenance is included in scheduled maintenance while corrective maintenance is included in un-scheduled maintenance. Scheduled maintenance is maintenance carried out at intervals of flight hours, flight cycle and aircraft age, for example C-check maintenance.

2.2 C-Check Maintenance

Some of the maintenance packages included in scheduled maintenance activities are A-check, C-check, and D-check. C-check maintenance is a type of aircraft maintenace package a predetermined time limit and is included in the heavy maintenance category so that the aircraft must enter the hangar. C-check maintenance is carried out on average every 24 months or 6,000 flight hours[2].

2.3 Failure Mode Effect Analysis (FMEA)

FMEA is a systematic method for identifying and preventing product and process problems before they occur. FMEA is focused on preventing defects, improving security, and increasing customer satisfaction. Ideally, FMEA is performed in the product design or process development stage, although performing FMEA on existing product and processes can also yield substantial benefits.

Preventing process and product problems before they occur is the goal of FMEA. Used in both the design and manufacturing processes, they substantially reduce cost by identifying product and process improvements early in the development process when changes are relatively easy and cheap to make. The result is a more robust process because the need for after-the-fact corrective action and late change crises will be reduced or eliminated.The goal of FMEA isnto look for all the ways a process or product could fail. Product failure occurs when the product does not function as intended or when it malfunctions in some way. Even the simplest products have many opportunities to fail. The FMEA process is a way to identify failures, effects, and risks in a process or product, and then eliminate or reduce them [3].

Evaluate the risk of failure

The relative risk of failure and its impact aredetermined by three factors:

- Severity = Consequences of failure if it occurs.
- Occurrence = Probability or frequency of failure.
- Detection = The probability that a failure is detected before the impact of the effect is realized.

Assessing RPN

Using data and knowladge about the process or product, each potential failure mode and effect is rated in each of these three factors on a scale ranging from 1 to 1000, from low to high. By multiplying the ratings for the three factors (Saverity* Occurrence*Detection) results in an RPN (Risk Priority Number) that will be determined for each potential failure mode and effect.All product, design and process FMEAs follow these ten steps [3]:

1. Process or product overview
2. Brainstorm potential failure modes
3. List the potential effects of each failure mode
4. Assign a serious rating to each effect
5. Set an occurrence rating for each failure mode
6. Assign detection ratings to each failure mode and/or effect
7. Calculate the RPN for each effect
8. Prioritize failure modes for action
9. Take action to eliminate or reduce high-risk failure modes
10. Calculate the resulting RPN when failure modes are reduced or eliminated.

3. Data Processing and Evaluation of Treatment Delays C-Checks

3.1 Research Analysis Flow

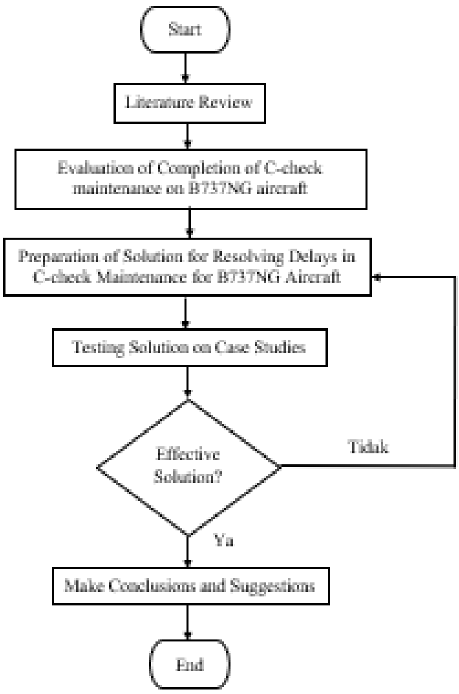

Fig. 1. Research flow diagram

3.2 Processing and Analysis of Aircraft Number Data

Check maintenance and other maintenance throughout 2021 on several types of aircraft at PT XYZ. Other treatments such as A-Check, Structural Check, and Interval Check. The maintenance schedule includes four different types of aircraft, namely B737-800NG, B737-900ER, A330-300, and B737 Max. This final assignment only focuses on the Boeing 737NG type with the number of aircraft carrying out C-Check reaching 19 aircraft out of a total of 65 aircraft types.

Table 1. PT XYZ maintenance document schedule [Source: Processed data]

A/C Type	CODE	A/C REG.	STA.	CAT	DESC	MHRS PHASE	DUE	PLAN DATE DOCK IN	REV TARGET	TARGET DATE	TAT PLAN	DELAY	TOTAL AOG MAINT
B737-900ER	ER	PK-ZJG	BTH	AP	PHASE 29	152,00	6-Mar	11 Mar	20 Nov 21	16 Apr	36	217	36
					PHASE 29	164,00	4-Jul						
					SWING COMPAS	TBA	17-Oct						
					PHASE 30	208,00	1-Nov						
B737-800	NG	PK-ZJQ	BTH	C-CHECK	C03 CHECK	3691,07	1-Jul	30 Jun	30 Nov 21	05 Aug	36	117	153
				AP	PHASE 29	164,00	11-Sep						
B737-900ER	ER	PK-ZFL	BTH	C-CHECK	C05 CHECK	500,00	15-Oct	10 Oct	07 Nov 21	23 Okt	13	15	28
				AP	PHASE 43	185,00	25-Nov						
B737-800	NG	PK-ZJS	BTH	C-CHECK	C03 CHECK	3691,07	28-Sep	27 Sep	19 Nov 21	2 Nov	36	17	53
				AP	PHASE 29	152,00	25-Nov						
B737-900ER	ER	PK-ZJJ	BTH	C-CHECK	C03 CHECK	3691,07	14-Apr	12 Oct	26 Nov 21	19 Nov	38	7	45
				AP	PHASE 28	152,00	14-Apr						
					PHASE 29	164,00	12-Aug						
					PHASE 30	208,00	10-Dec						

Table 2. C-check Data [Source: Processed data]

NO	TASK CARD	DESC	TOTAL WAKTU	ACTUAL	REASON OF DELAY	Delay
1		Maint. Preparation	02:15	02:25	-	
2	B789-20-110-01-01-MLI	GENERAL VISUAL INSPECTION OF EXTERNAL (COWL OPEN) HARNESS CONDITION AND SECURITY LEFT ENGINE	01:10	02:31	-	
3	B789-20-470-00-01-MLI	INSPECT THE IDG POWER FEEDER WIRING AND CONNECTED EWIS ENGINE NO 1	06:19	00:36	-	
4	B789-21-100-00-01-MLI	RESTORATION OF THE PRIMARY AND SECONDARY HEAT EXCHANGERS	03:00	03:00	-	
5	B789-21-150-00-01-MLI	RESTORE CABIN TEMPERATURE SENSOR FILTER	01:35	04:08	-	
6	B789-23-054-00-01-MLI	FUNCTIONAL CHECK OF THE VOICE RECORDER INDEPENDENT POWER SUPPLY	00:21	00:48	-	
7	B789-23-056-00-01-MLI	FUNCTIONAL CHECK OF THE VOICE RECORDER INDEPENDENT POWER SUPPLY MAINT. REPORT	01:30	01:50	-	
8	B789-23-080-00-01	OPERATIONAL CHECK OF OXYGEN MASK MICROPHONE	01:10	01:16	-	
9	B789-24-010-01-01-MLI	SERVICING OF IDG OIL-LEFT IDG	01:28	01:26	-	
10	B789-24-010-02-01-MLI	SERVICING OF IDG OIL-RIGHT IDG	08:17	02:08	-	
11	B789-24-040-01-01-MLI	REPLACE LEFT IDG CHARGE AND SCAVENGE FILTERS	08:17	02:08	Material	27 days
12	B789-24-040-02-01-MLI	REPLACE RIGHT IDG CHARGE AND SCAVENGE FILTERS	23:09	02:16	Manpower	18,49
13	B789-24-050-01-01-MLI	FUNCTIONAL CHECK OF LEFT QAD	23:09	20:14	-	
14	B789-24-060-01-01-MLI	GENERAL VISUAL INSPECTION OF LEFT ENGINE IDG SURFACE AIR COOLED OIL COOLER	01:00	01:00	-	
15	B789-25-040-00-01-MLI	DETAIL VISUAL INSPECTION OF PASSENGER SEAT BELTS	00:56	01:33	-	
16	B789-25-070-00-01-MLI	INSPECT PASSENGER SEAT BACK RECLINE MECHANISMS	01:23	01:23	-	
17	B789-25-090-00-01-MLI	INSPECT ATTENDANT SEAT HARNESS	02:39	02:33	-	
18	B789-25-100-00-01-MLI	INSPECT ATTENDANT SEAT HARNESS	01:00	01:00	-	
19	B789-25-130-00-01-MLI	INSPECT LAVATORY WASTE COMPARTMENT FLAPPER DOOR AND SPRING AND ACCESS DOOR	00:37	00:16	-	
20	B789-25-330-00-01-MLI	OPERATIONAL CHECK OF THE POWER MEGAPHONES	00:44	01:13	-	
21	B789-25-370-00-01-MLI	VISUALLY CHECK DETACHABLE EMERGENCY EQUIPMENT	00:30	00:05	-	
22	B789-25-380-00-01-MLI	OPERATIONAL CHECK OF THE EMERGENCY FLASHLIGHTS	00:30	00:05	-	
23	B789-25-400-00-01-MLI	DETAILED INSPECTION OF THE SMOKE HOODS	00:44	01:13	-	
24	B789-26-010-00-01-MLI	OPERATIONAL CHECK OF LAVATORY SMOKE DETECTOR	00:44	01:13	-	
25	B789-26-018-00-01-MLI	OPERATIONAL CHECK OF WING AND LOWER AFT BODY OVERHEAT DETECTION	00:20	00:33	Manpower	85,07
26	B789-26-050-00-01-MLI	VISUAL CHECK OF ENGINE FIRE BOTTLE PRESSURE GAUGES	04:55	85:15:00	-	
27	B789-26-300-00-01-MLI	DETAIL VISUAL INSPECTION OF THE LAVATORY FIRE BOTTLE FUSIBLE TIPS AND DISCHARGE TUBES	06:19	00:36	-	
28	B789-26-310-00-01-MLI	VISUAL CHECK OF THE LAVATORY HEAT SENSITIVE TAPE	00:30	00:50	-	
29	B789-26-550-02-01-MLI	CENTER WING REAR SPAR VAPOR WEB	01:00	01:00	-	
30	B789-27-099-00-01-MLI	ELEVATOR BALANCE TAB FREEPLAY FUNCTIONAL CHECK	00:43	00:46	-	

Table 3. C-check Data (Con't)

81	B789-70-810-02-01-MLI	GVI OF POWERPLANT NO.2	00:27	01:08	Finding	10 days
82	B789-71-010-01-01-MLI	DET INSPECTION OF THE LEFT INLET COWLS INNER SURFACE	01:20	01:33	-	
83	B789-72-020-01-01-MLI	DET INSPECTION OF THE LEFT ENGINE INLET AND FAN BLADES	03:20	17:00	Finding	4 days
84	B789-72-025-01-01-MLI	LEFT ENGINE FAN BLADES DOVETAIL LUBRICATION	06:19	00:35	Finding & Material	9 days
85	B789-72-070-02-01-MLI	VCK OF RIGHT ENGINE TRANSFER/ACCESSORY GEARBOX MOUNT FLANGES	06:19	00:35	Finding	7 days
86	B789-72-100-02-01-MLI	VCK OF RIGHT ENGINE ATTACHMENT BOLTS FOR THE THRUST MOUNT FITTINGS	06:19	00:35	-	
87	B789-72-110-02-01-MLI	VCK OF RIGHT ENGINE THRUST MOUNT FITTINGS	02:16	11:35	-	
88	B789-72-180-01-01-MLI	DET OF THE LEFT ENGINE COMBUSTION CHAMBER	02:21	09:09	Manpower	6,05
89	B789-72-200-01-02-MLI	BORESCOPE INSPECTION LEFT ENGINE HPT NOZZLE	01:31	10:09	-	
90	B789-72-210-01-01-MLI	INSPECTION OF THE LEFT ENGINE HPT BLADES	02:16	04:46	-	
91	B789-72-300-01-01-MLI	VCK OF THE LEFT ENGINE STAGE AFT MOUNTS CLEVIS	10:29	04:22	-	
92	B789-74-020-01-01-MLI	DET OF THE BOTH LEFT ENGINE IGNITION LEADS	08:54	01:30	-	
93	B789-78-050-02-01-MLI	RIGHT ENGINE T/R FAN DUCT WALLS	04:20	01:53	-	
94	B789-78-070-01-01-MLI	VCK OF THE LEFT ENGINE BLOCKER DOORS	03:30	03:50	Finding	28 days
95	B789-78-080-01-01-MLI	DET OF LEFT ENGINE BULLNOSE SEAL AND RETAINER	02:59	02:01	-	
96	B789-78-100-01-01-MLI	LEFT ENGINE T/R FIRE SEAL	03:20	03:33	-	
97	B789-78-120-01-01-MLI	OPC OF LEFT ENGINE BITE CHECK THE EAU	01:03	01:16	-	
98	B789-78-130-01-01-MLI	OPC OF THE LEFT ENGINE LIGHT INDICATION SYSTEM	01:03	01:16	-	
99	B789-80-010-01-01-MLI	DET VISUAL INSPECTION OF THE LEFT ENGINE STARTER	00:19	00:31	-	
100	B789-80-010-02-01-MLI	DET VISUAL INSPECTION OF THE RIGHT ENGINE STARTER	00:19	00:31	-	

4. Analysis of Evaluation Results for Delay in Treatment C-Check

4.1 Define Stage

Define stage, at this stage a definition of the root of the problem which is the cause of the C-check delay will be carried out the maintenance.

Table 4. Percentage of delay C-check [Source: Processed data]

Aircraft Type	Number of Aircraft	Delay (Days)	Percentage (%)
B737-800 NG	19	10	0.53
B737-900 ER	29	38	1.31
A330-300	8	24	3
B737 Max	9	369	41
Total	65	441	11.46

It was concluded that from 4 types of aircraft with a total of 65 aircraft which achieved a total delay of 441 days, the delay percentage reached 11.46%. Because the analysis focused on the B737-800NG type with a total of 19 aircraft experiencing a total TAT delay of 10 days and the maintenance delay percentage reached 0.53%. So, next an analysis was carried out regarding the factors causing delays in completing C-check on the Boeng 737NG aircraft type belongng to PT XYZ.

4.2 Measure Stage

To carry out analysis using FMEA, the RPN is determined by multiplying the ratings of Saverity, Occurrence, and Detection, the results of which are expressed in numerical form. Below is presented the rating data for Saverity, Occurrence, and Detection. Table 5 explain the saverity used to calculate the FMEA value.

Table 5. Saverity of Delay [Source: Processed data]

Ratings	Category	Criteria
1	There are no consequences	There is no *delay*
2	Very light	There was *a delay of* 1.5 hours which could cause an estimated loss of IDR 236 million
3	Light	There was a 3 hour *delay* which could cause an estimated loss of IDR 472.5 million
4	Very low	There was *a delay* of ½ day which could cause an estimated loss of IDR 750 million
5	Low	There was *a delay* of 1 day which could cause an estimated loss of up to IDR 1.5 billion
6	Currently	There was *a delay* of 3 days which could cause an estimated loss of IDR 4.5 billion
7	Tall	There was *a delay* of 7 days which could cause an estimated loss of IDR 10.5 billion
8	Very high	There was *a delay* of 10 days which could cause an estimated loss of up to IDR 15 billion
9	Dangerous	*Delays* often occur, so they can affect flight security
10	Very dangerous	There are always *delays* , which can have an impact on flight security

It can be concluded to look for revenue based on saverity criteria, then assuming the aircraft type is B737NG, destination Jakarta-Surabaya with a time 1.5 hours for 6 take-offs a day, with an average ticket price of IDR 1,250,000 and the number of seats is 189 pax so that total revenue is obtained of 1.5 billion per-day.

Tabel 6 explains the occurrence to assess the frequency of causes of problems which is then used calculate the FMEA value.

Table 6. Occurrence of Delay [Source: Processed data]

Ratings	Category	Criteria
1	There isn't any	There is no cause for *delay* at all during the C- *check maintenance completion period*
2	Very low	*delay* occurs once per C-check maintenance period
3	Light	*delays* occurs 3 times per C-check maintenance period
4	Currently	*delays* occurs 5 times per C-check maintenance period
5		*delays* occurs 7 times per C-check maintenance period
6		*delay* problem 9 times per C-check maintenance period
7	Tall	*delays* occurs 15 times per C-check maintenance period
8		*delays* occurs 20 times per C-check maintenance period
9	Very high	There are often problems *with delays* per C-check maintenance period
10		There is always a problem of *delays* per C-check maintenance period

Table 7 explains detection to assess whether the symptoms of the cause of the problem can be detected so that the problem can be avoided or prevented which is then used to calculate the FMEA value.

Table 7. Detection of Delay [Source: Processed data]

Ratings	Category	Criteria
1	Almost impossible	Material needs are only known after rare *findings occur*
2	Very rarely	Urgent material needs can be carried out by *robbing*
3	Seldom	*Forecasting* of C- *check implementation* was carried out with the help of the IT system
4	Very low	Increased work *tasks due to the large number of findings*
5	Low	Increased processing time after *a finding is discovered*
6	Currently	The need for *manpower* increased after the *discovery*
7	A bit high	When it is found *that* the material is not available in the warehouse
8	Tall	Unavailability of *manpower* when damage is discovered
9	Very high	During the inspection, *a defect was found* in the aircraft material
10	Almost certainly	There was *a delay in the* previous C- *check* work package

The next step taken is to calculate each failure mode according to the rating for delays in completing the C-check in table 8 below.

Table 8. FMEA [Source: Processed data]

		FMEA Process							Action Result			
No	*Potential Failure Mode*	*Potential Effect of Failure*	*Severity*	*Occurrence*	*Detection*	*RPN*	*Rank*	*Recommended Action*	*Severity*	*Occurrence*	*Detection*	*RPN*
1	Pembuatan *job card* yang tidak lengkap	Dapat menghambat proses perawatan	3	3	1	9	12	Melakukan *training* agar mekanik lebih teliti	2	3	1	6
2	Banyaknya *finding*	Menambah waktu pekerjaan untuk perbaikan	8	4	2	64	3	Menentukan jadwal perbaikan secepat mungkin	7	4	2	56
3	Menunggu *approval* penyediaan material	Menghambat persediaan material	6	3	2	36	9	Melakukan audit secepatnya agar *spare part* tepat waktu	5	3	2	30
4	*Stock* material kosong	Tidak dapat dilakukan perbaikan	9	1	9	81	2	Selalu mengontrol persediaan material/melakukan robbing	8	1	8	64
5	Membutuhkan skill khusus	Pekerjaan perawatan yang terbatas	1	1	1	1	13	None	1	1	1	1
6	Perlu melakukan *training* khusus untuk lisensi	Pekerjaan perawatan yang terbatas	1	1	1	1	14	None	1	1	1	1
7	Tidak memperhatikan rasio pekerjaan dengan *manpower*	Meningkatnya *duration* pekerjaan	9	3	8	216	1	Menambah tenaga kerja *manpower* untuk meminimalisir *duration*	7	3	8	168
8	TAT yang tidak sesuai dengan jadwal	Meningkatnya waktu penyelesaian TAT	1	5	8	40	6	Menetapkan estimasi waktu TAT dari jauh-jauh hari	1	5	7	35
9	Kebijakan dari PT. XYZ	Masih banyaknya kelonggaran *maintenance*	1	1	1	1	15	None	1	1	1	1
10	*Stock* di gudang kosong	Menghambat persediaan material	9	4	1	36	8	Menetapkan persediaan material dari jauh-jauh hari	8	4	1	32
11	Material belum direservasi	Menghambat reservasi material	9	3	1	27	10	Mempercepat reservasi penyediaan material	8	3	1	24
12	*Stock* gagal reservasi	Tidak dapat dilakukan perbaikan	9	1	2	18	11	Mempercepat reservasi penyediaan *stock*	8	1	2	16
13	Material mengalami *defect*	Menambah waktu perbaikan material	9	5	1	45	4	Melakukan perawatan rutin untuk meminimalisir defect	8	5	1	40
14	*Repair order* belum dibuat	Menghambat penyelesaian perawatan	10	2	2	40	7	Mempercepat pembuatan *repair order*	9	2	2	36
15	*Shipping process part* yang lama	Menambah waktu untuk persediaan *part*	7	3	2	42	5	Melakukan *robbing*	6	3	2	36

From table 8, the FMEA analysis above can then be analysed using the Pareto diagram shown in table 9 and figure 2 with the aim of stating each failure mode which is the main priority in contributing to delays in completing the following C-check maintenance.

Table 9. Cumulative RPN Value [Source: Processed data]

No	Potential Failure Mode	RPN	Cumulative Total	Grand Total (100%)	Cumulative (%)
1.	Requires special skills	1	1	0,15	0,15
2.	Need to do special training for licensing	1	2	0,15	0,30
3.	Policies from PT. XYZ	1	3	0,15	0,46
4.	Incomplate job cand creation	9	12	1,37	1,83
5.	Stock failed reservation	18	30	2,74	4,57
6.	Materials have not been reserved	27	57	4,11	8,68
7.	Waiting for approval for material supply	36	93	5,48	14,16
8.	Stock in warehouse is empty	36	129	5,48	19,63
9.	TATs that are not in accordance with the schedule	40	169	6,09	25,72
10.	Repair order has not been created	40	209	6,09	31,81
11.	Long shipping process part	42	251	6,39	38,20
12.	Materials have defects	45	296	6,85	45,05
13.	Number of findings	64	360	9,74	54,79
14.	Stock material is empty	81	441	12,33	67,12
15.	Does not pay attention to the ratio of work to manpower	216	657	32,88	100,00

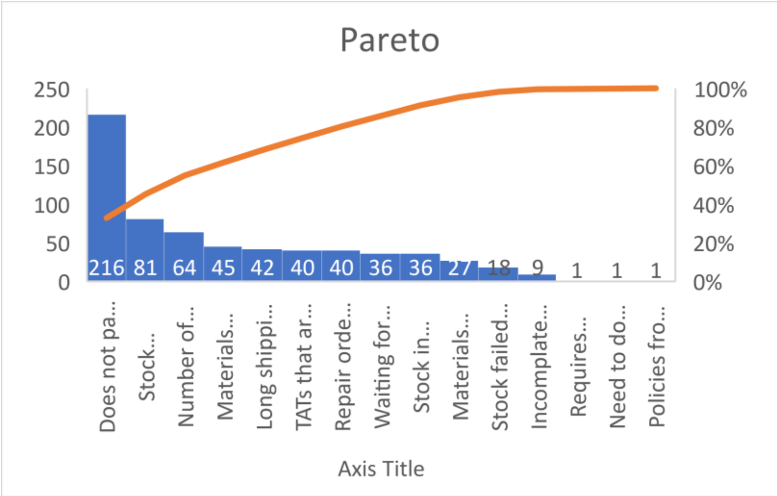

Fig. 2. Pareto RPN Diagram

From the results of the analysis using Pareto diagram which shows problems based on the number of failures, it is known that the ratio of workers to manpower is 216 and the cumulative percentage reaches 100%, which is at the highest level of the RPN.

4.3 Analyse Stage

Based on the results of interviews, observations and brainstorming that have been carried out to find the root cause of the delay in completing C-check maintenance using the fishbone diagram method in Figure 3 below.

[Source: Processed data]

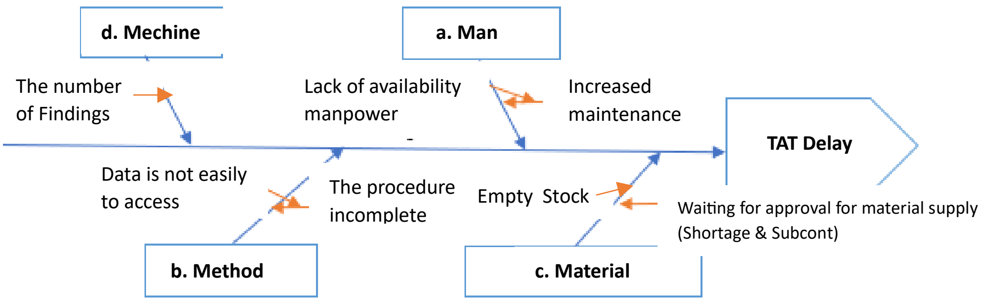

Fig 3. Fishbone Diagram

Based on the results of the analysis using the fishbone diagram method, a calculation of the initial RPN value was obtained which was the cause of the biggest problem in delays in completing C-check maintenance in table 10.

Table 10. Initial RPN Calculation Using the Fishbone Method [Source: Processed data]

Element	Solution	Severity	Occurrence	Detection	Initial RPN
Man	Not paying attention to the ratio of work to *manpower*	9	3	8	216
Material	*Stock* material is empty	9	1	9	81
Machine	Number of *findings*	8	4	2	64
Method	Creating incomplete *job cards*	3	3	1	9

4.4 Improve Stage

From the results of the explanation via fishbone diagram, the root cause of the delay will be analysed using FMEA method to determine the critical level and reduce the Risk Priority Number calculation which is explained in table 11 below.

Table 11. Final RPN Calculation Using the Fishbone Method

Element	Solution	Severity	Occurrence	Detection	Final RPN
Man	Adding workers (HR) or *manpower* to minimize *the duration* (length of work)	7	3	8	168
Material	Always control the amount of material available and the time for material procurement well in advance so that it is on time	8	1	9	64
Machine	Set a repair schedule as quickly as possible so as not to extend the TAT time	7	4	2	56
Method	Conduct *training* so that mechanics are more thorough	2	3	1	6

It can be concluded that reducing the RPN value can reduce the risk of delays in C-check maintenance on B737NG aircraft at PT.XYZ.

5. Conclusions and Suggestions

5.1 Conclusion

The conclusions obtained from the results of this final assignment are as follows.

a. TAT (Turn Around Time) delay of 10 days and the maintenance delay percentage reached 0.53% of the total 11.46% at the completion of one C-check maintenance period for the B737NG aircraft from the results of the scheduling analysis at PT XYZ.

b. There are three main factors that cause delays in TAT from completing C-check maintenance which is determined based on the highest RPN value from the cumulative percentage of the Pareto diagram, namely not paying attention to the work to manpower ratio of 100%, empty material stock of 67.12%, and the number of findings amounting to 54.79%

c. Check maintenance based on the factors above is to increase labor (HR) or manpower to minimize the duration (length of work), determine the estimated amount of material availability and material procurement time in advance so that on time, and determine the repair schedule as quickly as possible so as not to extend the TAT time.

5.2 Suggestions

1. From this analysis, it is recommended that we can analyse and optimize the aircraft maintenance process time using more C-check data to obtain more significant results.
2. Can be developed by carrying out software simulations to make research easier in a larger number of work tasks.

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