

CHAPTER 4 - RESULT AND DISCUSSIONS

4.1 Improvement

4.1.1 Operation Training

Operation Training is training conducted at PT. XYZ to deepen the correct operation of the unit in accordance with the rules of the principal. Operation Training will be carried out from May 30, 2023 to June 2, 2023, with material on Safety Operation, Product Knowledge, Instrument Panel and Control, Daily Maintenance, and Operation Technic.



Figure 4.1 Opening Training



Figure 4.2 In Class Training



Figure 4.3 Daily Maintenance Practice



Figure 4.4 Instrument Panel Training



Figure 4.5 Operation Training

Table 4.1 Operation Training Report

PT UNITED TRACTORS Tbk		LAPORAN PELATIHAN		TRS 011A (0)					
PRODUCT SUPPORT TECHNICAL TRAINING									
Nama Pelatihan : Operation and Daily Maintenance SCM Truck P410/P360		Tempat Pelaksanaan : Lahat / OFFICE PT ABL							
Periode Pelatihan : 30 Mei 2023 s.d. 02 Juni 2023		Penanggung Jawab : MUSHOWWI ZAH							
MATERI PELAJARAN									
No	Materi	Waktu	Instruktur	No	Materi				
1	Safety Operation	4	MUSHOWWI ZAH						
2	Product Knowledge	4	MUSHOWWI ZAH						
3	Instrument Panel and Control	4	MUSHOWWI ZAH						
4	Daily Maintenance	4	MUSHOWWI ZAH						
5	Operation Technic	14	MUSHOWWI ZAH						
EVALUASI TEORIS									
No	Nama Peserta	HRP	Tempat & Tanggal Lahir	Cabang	Nilai	Lulus / Tidak Lulus	Keterangan		
					Pengetahuan Rata	Praktek Rata			
1	Bun Dams		Gurung Kembar, 27 Apr 1994	TJ	78	73	100	Lulus	
2	Aun Heris		Tobatang, 01 Jul 1990	TJ	74	74	100	Lulus	
3	And Septi		Tobatang, 18 Jun 1976	TJ	61	72	100	Lulus	
4	Apri Yanto		Batuaja, 08 Apr 1987	TJ	70	73	100	Lulus	
5	Dan Al Daula		Kian Lator, 02 Mar 1985	TJ	70	74	100	Lulus	
6	Pitarayati		Tanjung Enim, 25 Sep 1976	TJ	72	73	100	Lulus	
7	Muhammad Yari		Cahaya Alam, 21 Jul 1972	TJ	68	74	100	Lulus	
TOTAL RATA-RATA KELAS					0	76	73	300	
EVALUASI PELATIHAN									
ASPEK PENILAIAN		Nilai				Sistem Penilaian			
		Ru	Cu	Bu	BS				
1. Aspek Penilaian	1. Penilaian awal latihan	0	0	0	0				
	2. Penilaian Materi	0	0	0	0				
	3. Penilaian Pengetahuan	0	0	0	0				
	4. Penilaian Praktek	0	0	0	0				
2. Aspek Penilaian	1. Penilaian Materi	0	0	0	0				
	2. Penilaian Pengetahuan	0	0	0	0				
	3. Penilaian Praktek	0	0	0	0				
	4. Penilaian Pengetahuan	0	0	0	0				
3. Aspek Penilaian	1. Penilaian Materi	0	0	0	0				
	2. Penilaian Pengetahuan	0	0	0	0				
	3. Penilaian Praktek	0	0	0	0				
	4. Penilaian Pengetahuan	0	0	0	0				
4. Aspek Penilaian	1. Penilaian Materi	0	0	0	0				
	2. Penilaian Pengetahuan	0	0	0	0				
	3. Penilaian Praktek	0	0	0	0				
	4. Penilaian Pengetahuan	0	0	0	0				
5. Aspek Penilaian	1. Penilaian Materi	0	0	0	0				
	2. Penilaian Pengetahuan	0	0	0	0				
	3. Penilaian Praktek	0	0	0	0				
	4. Penilaian Pengetahuan	0	0	0	0				

Saran Instruktur

- Saat awal dan akhir pelatihan, instruktur harus memastikan bahwa peserta telah memahami materi yang disampaikan.
- Gunakan metode Manual Overhead (MO) saat di front loading, disposal, transfer dan jalan.
- Siapkan lingkungan untuk dengan kondisi jalan.
- Rencanakan kegiatan pengamatan secara mendetail.
- Gunakan KPI maksimal 100 saat di lapangan.
- Jangan melakukan pengamatan secara kejar untuk memastikan materi yang disampaikan.

NOTE:

- * Kriteria kelulusan:
 - Kehadiran minimum 90% dari Total Hari Pelatihan
 - Tinggi Kelulusan:
 - Teori : Minimum 70
 - Praktek : Minimum 70
- * Metode Pelatihan:
 - 30% Teori
 - 70% Praktek

Tanjung Enim, 05 Juni 2023


MUSHOWWI ZAH
Penanggung Jawab

From the operation training report in table 4.16, the training was attended by 7 participants with a training duration of 4 days with 5 materials on Safety Operation, Product Knowledge, Instrument Panel and Control, Daily Maintenance, and Operation Technic. And the average score for theory is 76 points from a 100-point scale, the average for practice is 73 points from a 100-point scale, and 7 trainees are declared passed according to the passing criteria, namely 90% attendance from the total training days, a minimum theory value of 70 points from a 100-point scale and a minimum practice value of 70 points from a 100-point scale. This can indicate that the operator's ability is above the standard average so little

4.1.2 Maintenance Training

Maintenance training is training conducted at PT. XYZ to deepen the way to properly maintain the unit according to the rules of the operation manual book. Maintenance training will be carried out from September 6, 2023 to September 8, 2023, with Basic Maintenance, FOWA, Periodic Inspection, Periodic Service materials.



Figure 4.6 In Class Training



Figure 4.7 Maintenance Training Practice

Table 4.2 Report Maintenance Training

PT UNITED TRACTORS Tbk		LAPORAN PELATIHAN		TRS 011A (0)					
Nama Pelatihan : Preventive Maintenance SCII Truck		Tempat Pelaksanaan : Office PT ABL site Bukit Telanjuk / Ruang meeting							
Periode Pelatihan : 06 September 2023 s.d 08 September 2023		Penanggung Jawab : YOGIE RAHMAT ADI WIJAYA							
MATERI PELAJARAN									
No	Materi	Waktu	Instruktur						
1	Basic Maintenance	4	YOGIE RAHMAT ADI WIJAYA						
2	FOWA	4	YOGIE RAHMAT ADI WIJAYA						
3	Periodic Inspection	6	YOGIE RAHMAT ADI WIJAYA						
4	Periodic Service	6	YOGIE RAHMAT ADI WIJAYA						
EVALUASI TEKNIS									
No	Nama Peserta	HRP	Tempat & Tanggal Lahir	Cabang	NILAI			Lulus / Tidak Lulus	Keterangan
					Teori	Praktik	Keseluruhan		
1	AGI PRASATYIO		Jember Jawa, 23 Mar 1992	TJE	0	70	70	Lulus	
2	ANDRY RIZKY G.S		RESAN, 18 Mei 1998	TJE	0	64	70	Tidak Lulus	Nilai Kurang dari 70
3	Dimas Anfal Ami		Banyuwangi, 19 Agu 2003	TJE	0	56	70	Tidak Lulus	Nilai Kurang dari 70
4	DIMAS KIKI RAMADHANI		Klaten, 24 Okt 2004	TJE	0	68	70	Tidak Lulus	Kehadiran kurang dari 90 persen
5	INDRA TRI PRASETYO		BANYUWANGI, 12 Mar 2000	TJE	0	65	70	Tidak Lulus	Nilai Kurang dari 70
6	Adi Dwi Saputra		YAHU, 13 Mei 1994	TJE	0	50	70	Tidak Lulus	Nilai Kurang dari 70
7	Angga Neta Pratomo		TALUNAGADU, 18 Feb 1996	TJE	0	70	70	Lulus	
8	MUHAMMAD NURUL FATHONI		Marga mika, 02 Mar 2001	TJE	0	57	70	Tidak Lulus	Nilai Kurang dari 70
9	Muhammad Budi Santosa		Klaten, 31 Mar 1991	TJE	0	70	70	Lulus	
10	RISKI SEPTIANNAH		Kuta buri, 24 Sep 2000	TJE	0	65	70	Tidak Lulus	Nilai Kurang dari 70
11	RUDI KURNIAWAN		Batu, 12 Feb 1982	TJE	0	71	70	Lulus	
12	RIVALD PRATAPA SUPRADI		BANYUWANGI, 16 Jul 2004	TJE	0	70	70	Lulus	
TOTAL RATA-RATA KELAS					0	65	70	57	
EVALUASI PELATIHAN									
ASPEK PELATIHAN	Nilai				Saran Perbaikan				
	Ra	Co	Pr	BB					
Aspek Lulusan	1. Persiapan teoritis terapan	0	0	12	0				
	2. Kelengkapan Papan	0	0	12	0				
	3. Petunjuk pemeliharaan	0	0	12	0				
	4. Pemeliharaan terapan	0	0	12	0				
Aspek Instruktur	1. Kemampuan menjelaskan materi	0	0	11	1				
	2. Kemampuan mengawasi pelaksanaan	0	0	12	0				
	3. Kemampuan mengawasi pelaksanaan	0	0	12	0				
	4. Kemampuan mengawasi materi pengajaran	0	0	12	0				
Aspek Fasilitas	1. Pengetahuan dan praktek	0	0	12	0				
	2. Pengetahuan dan keterampilan praktis	0	0	12	0				
	3. Pengetahuan dan keterampilan teoretis	0	0	12	0				
	4. Pengetahuan dan keterampilan teoretis	0	0	12	0				
Aspek Penilaian	1. Kelengkapan fasilitas belajar	0	0	12	0				
	2. Kelengkapan alat-alat tulis	0	0	12	0				

From the maintenance training report in table 4.17, the training consists of 4 materials, namely Basic Maintenance, FOWA, Periodic Inspection, Periodic Service with passing criteria, namely passing criteria of 90% attendance from the total training days, a minimum theoretical value of 70 points from a 100-point scale and a minimum practice value of 70 points from a 100-point scale. The result of table 20 above is the average value of class theory which is 65 points from a 100-point scale and the average value of practice is 70 points from a 100-point scale. So that from the number of participants who were declared passed in maintenance training as many as 5 participants from 12 training participants. Based on the results of the training above, there are still 7 participants who have not passed the maintenance training due to the habit of using non-standard terms and working based on the experience they have not based on the correct theory, for these results it is necessary to do further training on Basic Maintenance.

4.1.3 Customer Operation Improvement Program (COIP)

Customer Operation Improvement Program (COIP) is an improvement program carried out to see how customers operate units. In this study, the Customer Operation Improvement Program (COIP) uses 4 assessment areas, namely:

1. Loading Point Area is an assessment carried out to see the condition of coal or soil material loading activities, so that the level of improvement is known.
2. Hauling Road is an assessment carried out to see road conditions to transport coal or soil materials from the loading area to the Disposal Area, so that the level of improvement is known.
3. Disposal Area is an assessment carried out to see the condition of coal or soil material loading activities from the loading point, so that the level of improvement is known.
4. Operation of Dump Truck is an assessment carried out to see the condition of the operator in operating the dump truck in accordance with applicable guidance. To know the level of improvement.

Customer Operation Improvement Program (COIP) has 5 levels of clustering levels, namely: Excellent Process, Good Process, with Improvements, Basic Process, need Improvements, Below Basic Process, dan Bad Process.

Table 4.3 Score Clustering COIP

Score Clustering	Remark
Point 5	Excellent Process
Average Point 4 - 4,99	Good Process, with Improvements
Average Point 3 - 3,99	Basic Process, need Improvements
Average Point 2 - 2,99	Below Basic Process
Average Point 0 - 1,99	Bad Process

Table 4.4 Table COIP Assessment

No	Assessment Area	Description	Rule of Thumb	Guidance	Before Improvement						After Improvement					
					Score					Total Score	Score					Total Score
					1	2	3	4	5		1	2	3	4	5	
1.1	Loading Point Area	Bench Height	Bench loading : Ideal bench height (40 – 70 % digging depth) Clean front loading surface (no material splatter) Top loading : There is a safety berm The position of the dump truck is close to the material taken	Score 5 = Optimal Bench Height 40 - 50 % Depth Digging Score 3 = Bench Height Still in Range but not optimum 51 - 75% Score 1 = Bench Height Below 50% and Above 75%					1	5					1	5
1.2	Loading Point Area	The surface of the plane on which the unit works	Conditions of the plane where the unit sits/works should be flush with a slope of no more than 3 degrees (Parallel & Transverse Track Shoe)	- Score 5 = According to the rule of thump - Score 1 = According to the rule of thump					1	5					1	5
1.3	Loading Point Area	Field Density Where to Work	Track depth conditions maximum load parallel Track Roller	- Score 5 = According to the rule of thump - Score 1 = According to the rule of thump					1	5					1	5
1.4	Loading Point Area	Wide Front Area For Dump Truck Maneuvering	Front Area Width for minimum DT maneuver is 3 times the turning radius of the Largest DT	- Score 5 = According to the rule of thump - Score 1 = According to the rule of thump					1	5					1	5

No	Assessment Area	Description	Rule of Thumb	Guidance	Before Improvement				After Improvement								
					Score			Total	Score			Total					
1.5	Loading Point Area	Rolling Resistance area Front Loading	Maximum Rolling Resistance 5%	Score 5 = $RR \leq 5\%$ Score 3 = $RR = 6\% - 7\%$ Score 1 = $RR \geq 8\%$			1				3			1			3
2.1	Hauling Road	Lebar Jalan (Two Ways)	Road Width (two ways) Minimum straight Road Width = 3.5 times the width of DT Largest Bend Road Width: 4 times DT width Elevation & Superelevation on straight roads & curves based on reference Unit width = 2.5 meters	Score 5 > 3,5 x wide of DT Score 4 = 3,5 x wide of DT Score 3 = 2,5 -3 x wide of DT Score 2 = 2 - 2,5 x wide of DT Score 1 < 2 kali lebar DT			1					2		1			2
2.2	Hauling Road	Rolling Resistance	Rolling Resistance under 4%	Score 5 = $RR \leq 4\%$ Score 3 = $RR = 5\% - 7\%$ Score 1 = $RR \geq 8\%$			1						3		1		3
2.3	Hauling Road	Road Grade	Roal Max Grade 8%	Score 5 = Grade < 8% Score 3 = Grade > 8% Score 1 = Grade > 10%					1				5			1	5
2.4	Hauling Road	Sign Board	Sign Board at Crossroads, Blind Spot at Curves & Ramps	Score 5 = Adequate Sign Board Score 3 = There is a Sign Board but it is			1						3		1		3

No	Assessment Area	Description	Rule of Thumb	Guidance	Before Improvement			After Improvement		
					Score		Total	Score		Total
				inadequate Score 1 = No Sign Board						
2.5	Hauling Road	Visibility	Dust Severity Level 1) Low visibility > 100 Meter 2) Medium visibility 20 – 100 meter 3) High Visibility < 20 Meter	Score 5 = Visibility > 100 Meter Score 3 = Visibility 20 - 100 meter Score 1 = Visibility < 20 meter			1	5		5
2.6	Hauling Road	Bund wall height	Bund wall Height Minimum 3/4 of the wheel diameter of the largest unit	Score 5 = Bund wall Height $\geq$ 3/4 Largest Wheel Score 3 = Bund wall Height 1/2 Largest Wheel Score 1 = Bund wall Height 1/4 Largest Wheel			1	5		5
2.7	Hauling Road	Traffic	Average speed 20 - 25 km/h	Score 5 = Average speed 20-25 km/h Score 3 = Average speed 18 - 19 km/h Score 1 = Average speed < 18 km/h	1		1	1		3

No	Assessment Area	Description	Rule of Thumb	Guidance	Before Improvement					After Improvement								
					Score				Total	Score				Total				
3.1	Disposal Area	Wide access disposal area	The minimum DT disposal area access width is as wide as a standard road	Score 5 > 3,5 x Wide of DT Score 4 = 3,5 x Wide of DT Score 3 = 2,5 -3 x Wide of DT Score 2 = 2 - 2,5 x Wide of DT Score 1 < 2 x Wide of DT				1			4				1		4	
3.2	Disposal Area	Disposal Area Size	Area of dumping area according to the number of fleets	Score 5 = No Queue Score 1 = There's a queue					1		5					1		5
3.3	Disposal Area	Rolling Resistance area disposal	Maximum Rolling Resistance 5%	Score 5 = RR ≤5% Score 3 = RR = 6% - 7% Score 1 = RR ≥ 8%			1				3				1		3	
3.4	Disposal Area	High safety berm at Disposal	90% Dumping Clearance	Score 5 = 90% Dumping Clearance Score 3 = 25 - 50 % Dumping Clearance Score 1 = No Safety Berm			1				3				1		3	
4.1	Application Operation of Dump Truck	Accelerator pedal application	Doesn't play gas (blayer). Maintain rotation at Rpm 1100-1500 (Green Zone). No overrunning (Red Zone) Step on the gas slowly Dumping Rpm Not more than 1500 Rpm Use RPM 2000-2200 when going downhill Coasting	Score 5 = All rules of thumb are met Score 4 = 5-6 rule of thumb is met Score 3 = 3-4 rule of thumb is met Score 2 = 1-2 rule of thumb is met Score 1 = Apart from the Rule of thumb		1					2					1		4

No	Assessment Area	Description	Rule of Thumb	Guidance	Before Improvement					After Improvement				
					Score					Score				
4.2	Application Operation of Dump Truck	Transmission Application	Immediately shift into neutral when the unit stops Initially move with load using gear C. Using Manual Offroad Mode when on the front, uphill and throwing Using Automatic mode when the road is good Shift gears to the right position Reduce gear before descending	Score 5 = All rules of thumb are met Score 4 = 5-6 rule of thumb is met Score 3 = 3-4 rule of thumb is met Score 2 = 1-2 rule of thumb is met Score 1 = Apart from the Rule of thumb		1						1		4
4.3	Application Operation of Dump Truck	Brake Application	Use the parking brake if you stop for a long time Use the parking brake when loading and dumping Utilize engine brake when reducing speed Utilize the exhaust brake when reducing speed. Do not do Harsh Braking. Driver Coaching Score (Minimum Anticipation 80) Adjusts speed according to corner angle	Score 5 = All rules of thumb are met Score 4 = 5-6 rule of thumb is met Score 3 = 3-4 rule of thumb is met Score 2 = 1-2 rule of thumb is met Score 1 = Apart from the Rule of thumb			1					1		4

No	Assessment Area	Description	Rule of Thumb	Guidance	Before Improvement					After Improvement						
					Score					Total	Score					Total
4.4	Application Operation of Dump Truck	Steering Application	Do not turn the steering wheel when the unit is stopped Turn the steering wheel slowly Don't turn the steering wheel until it's stuck Do not maneuver at high speed	Score 5 = All rules of thumb are met Score 4 = 5-6 rule of thumb is met Score 3 = 3-4 rule of thumb is met Score 2 = 1-2 rule of thumb is met Score 1 = Apart from the Rule of thumb		1					2			1		3

Table 4.5 Table COIP Before Improvement

Assessment Area	Average Score	Percentage	Remark
Loading Point Area	4,60	92,00%	Good Process, with Improvements
Hauling Road	3,43	68,57%	Basic Process, need Improvements
Disposal Area	3,75	75,00%	Basic Process, need Improvements
Application Operation of Dump Truck	2,25	45,00%	Below Basic Process
Total	3,55	71,00%	Basic Process, need Improvements

From the assessment results before improvement in table 4.5, it is known that only the Loading Point Area has an average score of 4.60 (Good Process, With Improvement), while the Hauling Road has an average score of 3.43 (Basic Process, need Improvements), the Disposal Area gets an average score 3.75 (Basic Process, need Improvements), and Application Operation of Dump Truck received a score of 2.25 (Below Basic Process). The results of the 4 Assessment Areas above have an average score of 3.55 out of a total score of 5.00 or an Average Score of 71.00% (Basic Process, need Improvements).

Table 4.6 Table COIP After Improvement

Assessment Area	Average Score	Percentage	Remark
Loading Point Area	4,60	92,00%	Good Process, with Improvements
Hauling Road	3,71	74,29%	Basic Process, need Improvements
Disposal Area	3,75	75,00%	Basic Process, need Improvements
Application Operation of Dump Truck	3,75	75,00%	Basic Process, need Improvements
Total	3,95	79,00%	Basic Process, need Improvements

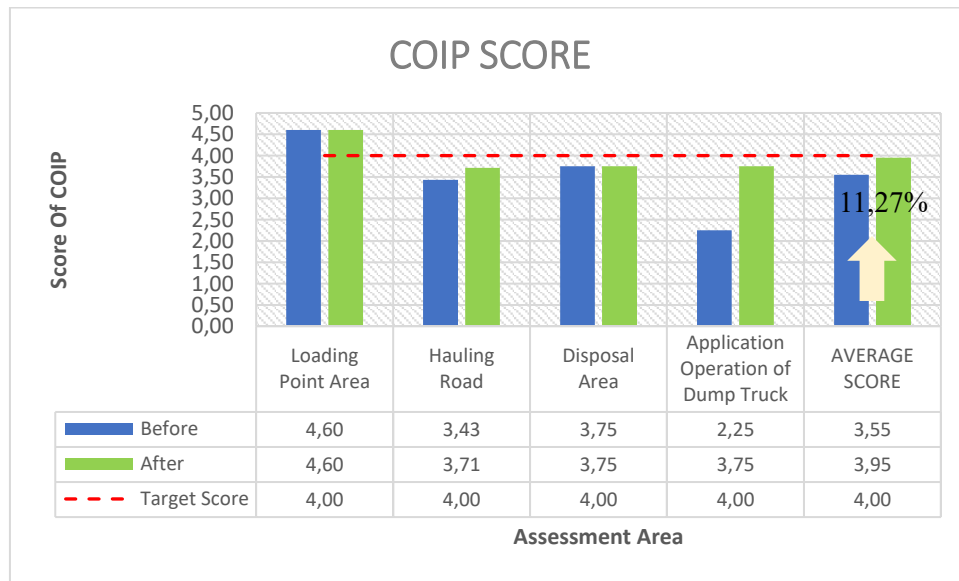


Figure 4.8 COIP Score

In table 4.6 and figure 4.8, the improvement focus on the Customer Operation Improvement Program (COIP) is prioritized on the Application Operation of Dump Truck because it gets a score of 2.25 (Below Basic Process). Improvements made to the Customer Operation Improvement Program (COIP) are training operations. By conducting training operation score from Application Operation of Dump Truck increased from 2.25 to 3.75 or increased by 11.27%, so that improvement training operations can be carried out.

4.1.4 Customer Maintenance Improvement Program (CMIP)

Customer Maintenance Improvement Program (CMIP) is a program used in this study that serves to measure the level of maintenance process and quality of the Scania P360/P410 maintenance unit. Customer Maintenance Improvement Program (CMIP) has 2 categories of assessment Maintenance Quality Product with 9 sub categories and a maximum total value of 290 and Maintenance Process with 15 sub categories and a maximum total value of 85 points.

Table 4.7 Form Assessment CMIP

No	Assessment Area	Component	Evaluation Item	Evaluation Point	Before Improvement						After Improvement					
					Score					Total Score	Score					Total Score
					1	2	3	4	5		1	2	3	4	5	
1.1	Maintenance Quality Product	Engine	Genuine engine oil	5: Use Scania Genuine Oil 4: Use oil engine with correct spec (15W/40) 2: Use oil engine with wrong spec. (non 15W/40) 1: Not Installed					1	5					1	5
1.2	Maintenance Quality Product	Engine	Engine oil level check	5: Daily 3: Weekly 1: Never					1	5					1	5
1.3	Maintenance Quality Product	Engine	Engine oil change interval	5: 250 hr 3: 500 hr 2: 1.000 hr 1: Never			1			3			1			3
1.4	Maintenance Quality Product	Engine	Genuine oil filter	5: Use genuine SCANIA oil filter 3: Use non genuine SCANIA oil filter 1: Not installed					1	5					1	5
1.5	Maintenance Quality Product	Engine	Engine oil filter change interval	5: 250 hr 3: 500 hr 2: 1.000 hr 1: Never			1			3			1			3
1.6	Maintenance Quality Product	Engine	Genuine fuel filter	5: Use genuine SCANIA fuel filter 3: Use non genuine SCANIA fuel filter 1: Not installed					1	5					1	5

No	Assessment Area	Component	Evaluation Item	Evaluation Point	Before Improvement					After Improvement				
					Score				Total	Score				Total
1.7	Maintenance Quality Product	Engine	Fuel filter replacement interval	5: 250 hr 3: 500 hr 2: 1.000 hr 1: Never			1		3			1		3
1.8	Maintenance Quality Product	Engine	Centrifugal Oil Filter (PN 2731875) replace interval	5: 250 hr 3: 500 hr 2: 1.000 hr 1: Never			1		3			1		3
1.9	Maintenance Quality Product	Engine	Genuine water separator filter	5: Use genuine SCANIA water separator filter 3: Use non genuine SCANIA water separator filter 1: Not installed				1	5				1	5
1.10	Maintenance Quality Product	Engine	Water separator filter change interval	5: 250 hr 3: 500 hr 2: 1.000 hr 1: Never			1		3			1		3
1.11	Maintenance Quality Product	Engine	Drain water from water separator	5: Daily 3: Weekly 1: Never				1	5				1	5
1.12	Maintenance Quality Product	Engine	Fuel cleanliness *fuel filtering in Fuel Station	5: Clean (no deposit), if there is filtering in Fuel Truck or Fuel Station 3: Cloudy 1: Deposit				1	5				1	5

No	Assessment Area	Component	Evaluation Item	Evaluation Point	Before Improvement				After Improvement			
					Score		Total		Score		Total	
1.13	Maintenance Quality Product	Engine	Genuine air filter	5: Use genuine SCANIA filter 3: Use non genuine SCANIA filter 1: Not installed			1	5			1	5
1.14	Maintenance Quality Product	Engine	Air filter change	5: When Indicator lamp ON. (1.000 hr) 3: 2.000 hr 2: Cleaning air filter 1: Never BY CONDITION	1			2	1			3
1.15	Maintenance Quality Product	Engine	Check & Adjust V	5: 2.000 hr 3: 4.000 hr 2: 6.000 hr 1: Never BY CONDITION	1			1	1			3
1.16	Maintenance Quality Product	Engine	Check & Adjust I	5: 2.000 hr 3: 4.000 hr 2: 6.000 hr 1: Never BY CONDITION	1			1	1			3
1.17	Maintenance Quality Product	Engine	Genuine coolant	5: Use genuine SCANIA coolant, SCANIA Ready Mix 3: Use non genuine SCANIA coolant. 2: Not use coolant, use water. 1: Not installed	1			1			1	5
1.18	Maintenance Quality Product	Engine	Coolant level check	5: Daily 3: Weekly 1: Never			1	5			1	5

No	Assessment Area	Component	Evaluation Item	Evaluation Point	Before Improvement					After Improvement				
					Score				Total	Score				Total
1.19	Maintenance Quality Product	Engine	Check pH Coolant with Refraktometer / Lab	5: 250 hr 3: 500 hr 2: 1.000 hr 1: Never	1				1			1		3
1.20	Maintenance Quality Product	Engine	Replace Coolant	5: 4.000 hr (1 tahun) 4: 6.000 hr 3: 8.000 hr 2: 10.000 hr 1: Never				1	5				1	5
2.1	Maintenance Quality Product	Clutch & Gear Box	Type Clutch Fluid	5: Yes, use Fluid : Brake Fluid/Dot4/3 3: Use not spec oil 1: Not installed				1	5				1	5
2.2	Maintenance Quality Product	Clutch & Gear Box	Clutch fluid oil level check	5: 250 hr 3: 500 hr 2: 1.000 hr 1: Never		1			2			1		3
2.3	Maintenance Quality Product	Clutch & Gear Box	Clutch wear check (manual check or in MID)	5: 250 hr 3: 500 hr 2: 1.000 hr 1: Never	1				1		1			2
2.4	Maintenance Quality Product	Clutch & Gear Box	Gearbox oil level check	5: 250 hr 3: 500 hr 2: 1.000 hr 1: Never		1			2		1			2

No	Assessment Area	Component	Evaluation Item	Evaluation Point	Before Improvement			After Improvement		
					Score		Total	Score		Total
2.5	Maintenance Quality Product	Clutch & Gear Box	Gearbox oil change interval	5: 1.000 hr 3: 2.000 hr 1: Never			1	5		5
2.6	Maintenance Quality Product	Clutch & Gear Box	Genuine Gearbox Oil	5: Yes, use Scania Genuine Oil 4: Yes, use spec Oil 85w-90 3: use spec Oil 85w-140 2: Not spec oil 1: Not installed			1	5		5
2.7	Maintenance Quality Product	Clutch & Gear Box	Genuine Oil filter Gearbox	5: Use genuine SCANIA oil filter 3: Use non genuine SCANIA oil filter 1: Not installed			1	5		5
2.8	Maintenance Quality Product	Clutch & Gear Box	Oil Filter Gearbox change interval	5: 1.000 hr 3: 2.000 hr 1: Never			1	5		5
2.9	Maintenance Quality Product	Clutch & Gear Box	Spec Retarder Oil : 15w-30/ATF Dexron III (if with Retarder)	5: Yes, use spec Engine oil/ATF Dexron III 2: Use not spec oil 1: Not installed			1	5		5
2.10	Maintenance Quality Product	Clutch & Gear Box	Oil Retarder change interval (if with Retarder)	5: 1.000 hr 3: 2.000 hr 1: Never			1	5		5
2.11	Maintenance Quality Product	Clutch & Gear Box	Genuine oil filter retarder (if with	5: Use genuine SCANIA oil filter 3: Use non genuine SCANIA oil filter 1: Not installed			1	5		5

No	Assessment Area	Component	Evaluation Item	Evaluation Point	Before Improvement			After Improvement		
					Score		Total	Score		Total
			Retarder)							
2.12	Maintenance Quality Product	Clutch & Gear Box	Oil filter Retarder change interval (if with Retarder)	5: 1.000 hr 3: 2.000 hr 1: Never			1	5		5
3.1	Maintenance Quality Product	Steering System	Steering oil level check	5: 250 hr 3: 500 hr 2: 1.000 hr 1: Never			1	5		5
3.2	Maintenance Quality Product	Steering System	Spec Steering Oil : ATF Dexron III	5: Yes, use spec ATF Dexron Dexron III 2: Use not spec oil 1: Not installed			1	5		5
3.3	Maintenance Quality Product	Steering System	Genuine filter steering	5: Use genuine SCANIA filter 3: Use non genuine SCANIA filter 1: Not installed			1	5		5
3.4	Maintenance Quality Product	Steering System	Filter steering change interval	5: 4.000 hr 3: 6.000 hr 1: Never			1	5		5
4.1	Maintenance Quality Product	Air & Brake System	Drain condensed water in air tank	5: Daily 3: Weekly 1: Never			1	5		5

No	Assessment Area	Component	Evaluation Item	Evaluation Point	Before Improvement					After Improvement				
					Score				Total	Score				Total
4.2	Maintenance Quality Product	Air & Brake System	Brake lining clearance check through slack adjuster	5: 250 hr 3: 500 hr 2: 1.000 hr 1: Never	1				1			1		3
4.3	Maintenance Quality Product	Air & Brake System	Replace Air Dryer APS Filter	5: 1.000 hr 3: 2.000 hr 1: Never				1	5				1	5
5.1	Maintenance Quality Product	Axle, Final Drive & Differential	Oil level check Dif	5: 250 hr 3: 500 hr 2: 1.000 hr 1: Never	CHECK WHEN PS							1		3
5.2	Maintenance Quality Product	Axle, Final Drive & Differential	Genuine Diff.Oil	5: Yes, use Scania Genuine Oil 4: Yes, use spec oil 85w-140 2: Use not spec oil 1: Not Installed				1	5				1	5
5.3	Maintenance Quality Product	Axle, Final Drive & Differential	Oil.Diff change interval	5: 1.000 hr 3: 2.000 hr 1: Never				1	5				1	5
5.4	Maintenance Quality Product	Axle, Final Drive & Differential	Genuine Oil Filter Diff.	5: Use genuine SCANIA filter 3: Use non genuine SCANIA filter 1: Not installed				1	5				1	5

No	Assessment Area	Component	Evaluation Item	Evaluation Point	Before Improvement			After Improvement		
					Score		Total	Score		Total
5.5	Maintenance Quality Product	Axle, Final Drive & Differential	Oil Filter Differential change interval	5: 1.000 hr 3: 2.000 hr 1: Never			1	5		5
5.6	Maintenance Quality Product	Axle, Final Drive & Differential	Cleaning & Replace Breather Base Diff	5: 1.000 hr 3: 2.000 hr 1: Never			1	5		5
6.1	Maintenance Quality Product	Electrical System	Battery cleanliness condition	5: Clean & no corrosive on battery pole. 1: Corrosive on battery pole, many dust.			1	5		5
6.2	Maintenance Quality Product	Electrical System	Check Battery (Battery) condition	5: Weekly 3: 250 hr 2: 500 hr 1: Never CHECK WHEN PS	1		2	1		3
6.3	Maintenance Quality Product	Electrical System	Genuine Fuse	5: All fuse are genuine SCANIA 3: Use non genuine fuse 1: Use non spec fuse USE LOCAL FUSE		1	3		1	5
7.1	Maintenance Quality Product	Chassis & Frame	Spec Grease : Lithium, NLGI 2 Non Molibdenum	5: Yes 1: No			1	5		5

No	Assessment Area	Component	Evaluation Item	Evaluation Point	Before Improvement					After Improvement					
					Score				Total	Score				Total	
7.2	Maintenance Quality Product	Chassis & Frame	Greasing interval per PI	5: 75 hr (3 hari sekali) 3: 100 hr 2: 125 hr 1: Never					1	5				1	5
7.3	Maintenance Quality Product	Chassis & Frame	Regular washing (all)	5: 250 hr 3: 500 hr 2: 1.000 hr 1: Never			1			3				1	5
8.1	Maintenance Quality Product	Suspension System	Check & Retorque (U bolt, Spring)	5: 250 hr 3: 500 hr 2: 1.000 hr 1: Never			1			3			1		3
8.2	Maintenance Quality Product	Suspension System	Jack & Greased Boogie Suspension	5: 250 hr 3: 500 hr 2: 1.000 hr 1: Never			1			3			1		3
8.3	Maintenance Quality Product	Suspension System	Check Axial & Radial Play Boogie	5: 250 hr 3: 500 hr 2: 1.000 hr 1: Never	1					1	1				2
8.4	Maintenance Quality Product	Suspension System	Visual Check Link Stabilizer, Track Rod, Shock Absorber	5: 250 hr 3: 500 hr 2: 1.000 hr 1: Never			1			3			1		3

No	Assessment Area	Component	Evaluation Item	Evaluation Point	Before Improvement					After Improvement					
					Score				Total	Score				Total	
9.1	Maintenance Quality Product	Hub & Wheel	Check Nut Indicator (PI)	5: 50 hr 3: 75 hr 2: 100 hr 1: Never			1			3			1		3
9.2	Maintenance Quality Product	Hub & Wheel	Retorque Bolt Tyre (after replace tyre)	5: 100 km 3: 200 km 2: 400 km 1: Never	1					1			1		3
9.3	Maintenance Quality Product	Hub & Wheel	Check pressure & thread tyre	5: 250 hr 3: 500 hr 2: 1.000 hr 1: Never		1				2		1			2
10.1	Maintenance Process	Mainten ance PS Sheet	Maintenance PS Sheet	5: Available, as standart OMM 4: Available 1: Not available.				1		4				1	5
10.2	Maintenance Process	Daily Driver Check (P2H)	Daily Driver Check (P2H)	5: Done and recorded consistently and sign by superior 4: Done and recorded consistently 3: Done and recorded 2: Done but not recorded 1: Not available				1		4				1	5

No	Assessment Area	Component	Evaluation Item	Evaluation Point	Before Improvement					After Improvement					
					Score					Total	Score				
10.3	Maintenance Process	Periodic Inspection (Backlog Inspection)	Periodic Inspection (Backlog Inspection)	5: Done and recorded consistently, share to Logistik and Vendor for provide parts 4: Done and recorded consistently, share to Logistik for provide parts 3: Done and recorded 2: Done but not recorded 1: Not available				1		4				1	4
10.4	Maintenance Process	Periodic Inspection (Backlog Execution)	Periodic Inspection (Backlog Execution)	5: Done and recorded consistently and review performance by superior 4: Done and recorded consistently 3: Done and recorded 2: Done but not recorded 1: Not available				1		4				1	4
10.5	Maintenance Process	Periodic Service	Periodic Service	5: Done and recorded consistently and review performance by superior 4: Done and recorded consistently 3: Done and recorded 2: Done but not recorded 1: Not available				1		4				1	5
10.6	Maintenance Process	System Maintenance	System Maintenance	5: Available maintenance records by program application and review performance by superior 4: Available maintenance records by program application 3: Available maintenance records by microsoft office			1			3				1	4

No	Assessment Area	Component	Evaluation Item	Evaluation Point	Before Improvement					After Improvement				
					Score				Total	Score				Total
				2: Available maintenance records but manually 1: Not available										
10.7	Maintenance Process	Fleet Management System	Fleet Management System	5: Active and registered to office and operation team, use it to improved driver behaviour 4: Active and registered to office and operation team, get in report 3: Mostly active 2: Partially active 1: Not available		1			2		1			2
10.8	Maintenance Process	Mechanic Availability	Mechanic Availability	5: Ratio mechanic vs population (1:2), there are specialis mechanic Scania 4: Ratio mechanic : population (1:2), don't have specialist mechanic Scania 3: More than minimum (more than 2 mechanic) 2: Have mechanic with minimal amount to backup population (under 2) 1: No mechanic				1	4				1	4

No	Assessment Area	Component	Evaluation Item	Evaluation Point	Before Improvement					After Improvement				
					Score				Total	Score				Total
10.9	Maintenance Process	Mechanic Training	Mechanic Training	5: Have PIC Technical Training and annual training program 3: Have PIC Technical Training 1: Don't have PIC Technical Training	1				1				1	5
10.10	Maintenance Process	Mechanic Training	Mechanic Training	5: Some have received PM, EHCS, MTS and Remove-Install (Rnl) training (4 modul) 4: Some have received PM, EHCS and Troubleshooting (MTS) training (3 modul) 3: Some have received PM & Electronic Hydraulic System (EHCS)/ MTs training (2 modul) 2: Some have received Preventive Maintenance (PM) training 1: Haven't received Maintenance training	1				1			1		3
10.11	Maintenance Process	Driver Training	Driver Training	5: Have PIC Driver Training and annual training program 3: Have PIC Driver Training 1: Don't have PIC Driver Training or Master Driver			1		3				1	5
10.12	Maintenance Process	Driver Training	Driver Training	5: Mostly received training and get licence to operated from internal company 4: All get training 3: Mostly get training 2: Some get training 1: Haven't training			1		3			1		4

No	Assessment Area	Component	Evaluation Item	Evaluation Point	Before Improvement					After Improvement				
					Score				Total	Score				Total
10.13	Maintenance Process	Organisasi	Organisasi	5: Organization consist of Operations, Driver, Mechanics, Plant Maintenance & Logistics included Planner and Admin, Development 4: Organization consist of Operations, Driver, Mechanics, Plant Maintenance & Logistics with Planner and Admin. 3: Organization consist of Operation, Driver, Mechanics, Plant Maintenance, Logistics 2: Organization already exists, consist of Operation and drivers 1: There is no organization running operational yet				1					1	
10.14	Maintenance Process	Workshop Availability	Workshop Availability	5: Available with suitable qty bays for backup unit. Have facilities incl. oil reels and oil storage. Have bays for repair dan Periodic Service. 4: Available with suitable qty bays for backup unit, use oil pan, oil reels, oil storage 3: Available with minimum bays for backup unit. use oil pan and oil storage 2: Available, with minimum facilities. Use oil pan 1: Not available.				1					1	

No	Assessment Area	Compon ent	Evaluation Item	Evaluation Point	Before Improvement					After Improvement					
					Score				Total	Score				Total	
10.15	Maintenance Process	Wareho use	Warehouse	5: Available, with facilities and all parts under roof, have program application 4: Available, with facilities and all parts under roof, use microsoft office system 3: Available, with facilities and mostly parts under roof, use microsoft office system 2: Available, with minimum facilities and minimum roof, use microsoft office system 1: Not available.				1		4				1	4
10.16	Maintenance Process	Part Book & Shop Manual (Multi)	Part Book & Shop Manual (Multi)	5: Install, up to dated 4: Install, still valid 3: Install, expired 1: Not available.				1		4				1	4
10.17	Maintenance Process	Mainten ance Tools Scania	Maintenance Tools Scania	Availability Tools for Backup Scania base on listed						0					0

Table 4.8 Summary CMIP Before Improvement

Assessment Area	Component	Average Score	Percentage	Remark
Maintenance Quality Product	Engine	3,55	71,00%	Basic Process, need Improvements
Maintenance Quality Product	Clutch & Gear Box	4,17	83,33%	Good Process, with Improvements
Maintenance Quality Product	Steering System	5,00	100,00%	Excellent Process
Maintenance Quality Product	Air & Brake System	3,67	73,33%	Basic Process, need Improvements
Maintenance Quality Product	Axle, Final Drive & Differential	4,67	93,33%	Good Process, with Improvements
Maintenance Quality Product	Electrical System	3,33	66,67%	Basic Process, need Improvements
Maintenance Quality Product	Chassis & Frame	4,33	86,67%	Good Process, with Improvements
Maintenance Quality Product	Suspension System	2,50	50,00%	Below Basic Process
Maintenance Quality Product	Hub & Wheel	2,00	40,00%	Below Basic Process
Maintenance Process	Maintenance PS Sheet	4,00	80,00%	Good Process, with Improvements

Assessment Area	Component	Average Score	Percentage	Remark
Maintenance Process	Daily Driver Check (P2H)	4,00	80,00%	Good Process, with Improvements
Maintenance Process	Periodic Inspection (Backlog Inspection)	4,00	80,00%	Good Process, with Improvements
Maintenance Process	Periodic Inspection (Backlog Execution)	4,00	80,00%	Good Process, with Improvements
Maintenance Process	Periodic Service	4,00	80,00%	Good Process, with Improvements
Maintenance Process	System Maintenance	3,00	60,00%	Basic Process, need Improvements
Maintenance Process	Fleet Management System	2,00	40,00%	Below Basic Process
Maintenance Process	Mechanic Availability	4,00	80,00%	Good Process, with Improvements
Maintenance Process	Mechanic Training	1,00	20,00%	Bad Process
Maintenance Process	Driver Training	3,00	60,00%	Basic Process, need Improvements
Maintenance Process	Organisasi	4,00	80,00%	Good Process, with Improvements

Assessment Area	Component	Average Score	Percentage	Remark
Maintenance Process	Workshop Availability	4,00	80,00%	Good Process, with Improvements
Maintenance Process	Warehouse	4,00	80,00%	Good Process, with Improvements
Maintenance Process	Part Book & Shop Manual (Multi)	4,00	80,00%	Good Process, with Improvements
Maintenance Process	Maintenance Tools Scania	0,00	0,00%	Bad Process
AVERAGE SCORE		3,63	72,53%	Basic Process, need Improvements

Table 4.9 Summary CMIP After Improvement

Assessment Area	Component	Average Score	Percentage	Remark
Maintenance Quality Product	Engine	4,10	82,00%	Good Process, with Improvements
Maintenance Quality Product	Clutch & Gear Box	4,33	86,67%	Good Process, with Improvements
Maintenance Quality Product	Steering System	5,00	100,00%	Excellent Process

Assessment Area	Component	Average Score	Percentage	Remark
Maintenance Quality Product	Air & Brake System	4,33	86,67%	Good Process, with Improvements
Maintenance Quality Product	Axle, Final Drive & Differential	4,67	93,33%	Good Process, with Improvements
Maintenance Quality Product	Electrical System	4,33	86,67%	Good Process, with Improvements
Maintenance Quality Product	Chassis & Frame	5,00	100,00%	Excellent Process
Maintenance Quality Product	Suspension System	2,75	55,00%	Below Basic Process
Maintenance Quality Product	Hub & Wheel	2,67	53,33%	Below Basic Process
Maintenance Process	Maintenance PS Sheet	5,00	100,00%	Excellent Process
Maintenance Process	Daily Driver Check (P2H)	5,00	100,00%	Excellent Process
Maintenance Process	Periodic Inspection (Backlog Inspection)	4,00	80,00%	Good Process, with Improvements
Maintenance Process	Periodic Inspection (Backlog	4,00	80,00%	Good Process, with Improvements

Assessment Area	Component	Average Score	Percentage	Remark
	Execution)			
Maintenance Process	Periodic Service	5,00	100,00%	Excellent Process
Maintenance Process	System Maintenance	4,00	80,00%	Good Process, with Improvements
Maintenance Process	Fleet Management System	2,00	40,00%	Below Basic Process
Maintenance Process	Mechanic Availability	4,00	80,00%	Good Process, with Improvements
Maintenance Process	Mechanic Training	4,00	80,00%	Good Process, with Improvements
Maintenance Process	Driver Training	4,50	90,00%	Good Process, with Improvements
Maintenance Process	Organisasi	4,00	80,00%	Good Process, with Improvements
Maintenance Process	Workshop Availability	4,00	80,00%	Good Process, with Improvements
Maintenance Process	Warehouse	4,00	80,00%	Good Process, with Improvements
Maintenance Process	Part Book & Shop Manual (Multi)	4,00	80,00%	Good Process, with Improvements

Assessment Area	Component	Average Score	Percentage	Remark
Maintenance Process	Maintenance Tools Scania	0,00	0,00%	Bad Process
AVERAGE SCORE		4,11	82,13%	Good Process, with Improvements

Table 4.10 Summary Assessment CMIP

Assessment Area	Average Score Before Improvement	Average Score After Improvement	Percentage GAP
Maintenance Quality Product	3,78	4,17	10,50%
Maintenance Process	3,12	3,88	24,53%
AVERAGE SCORE	3,63	4,11	13,24%

In table 4.8, it was found that there are several assessment areas that are included in the bad process, namely the maintenance process with the Mechanical Training component with a score of 1 point and the Scania Maintenance Tools with a score of 0 points. While those who get the Basic Process area, need Improvements are in the assessment area of Maintenance Quality Product with Engine components with a score of 3,55 points, Air & Brake System with a score of 3,67 points, and Electrical System with a score of 3,33 points. And assessment area Maintenance Process with component System Maintenance with a score of 3,00 points and Driver Training with a score of 3,00 points. When viewed from the points that get bad processes and Basic Processes, need improvements need to be done mechanical training and operation training.

After improvement, results were obtained in accordance with table 4.9 on the assessment of areas that were previously included in the bad process, namely in the maintenance process with the Mechanical Training component which originally had a score of 1 point changed to a score of 4 points and Scania Maintenance Tools with a score of 0 points still because a budget was needed for equipment investment. Meanwhile, those who get the Basic Process area, need Improvements are in the Maintenance Quality Product assessment area with the Engine component which originally scored 3,55 points changed to a score of 4,10 points, Air & Brake System which originally scored 3,67 points changed to a score of 4,33 points, and the Electrical System which originally scored 3,33 points changed to a score of 4,33 points. And the assessment area of the Maintenance Process with the System Maintenance component which was originally a score of 3,00 points changed to a

score of 4,00 points and Driver Training originally a score of 3,00 points changed to a score of 4,50 points.

For a summary of the improvement results can be seen in table 4.10 above, the average score for the Customer Maintenance Improvement Program (CMIP) before the improvement was made was 3,63 points and after improvement in the form of maintenance training, the average score rose to 4,11 points or increased by 13,24%, so that improvements with maintenance training can have an impact on the maintenance process.

4.2 Control

4.2.1 Calculate Physical Availability

After improvements are made in the form of Mechanical Training, Operation Training, Customer Operation Improvement Program, and Customer Maintenance Improvement Program, then Physical Availability calculations are carried out again to see the results of the improvements that have been made.

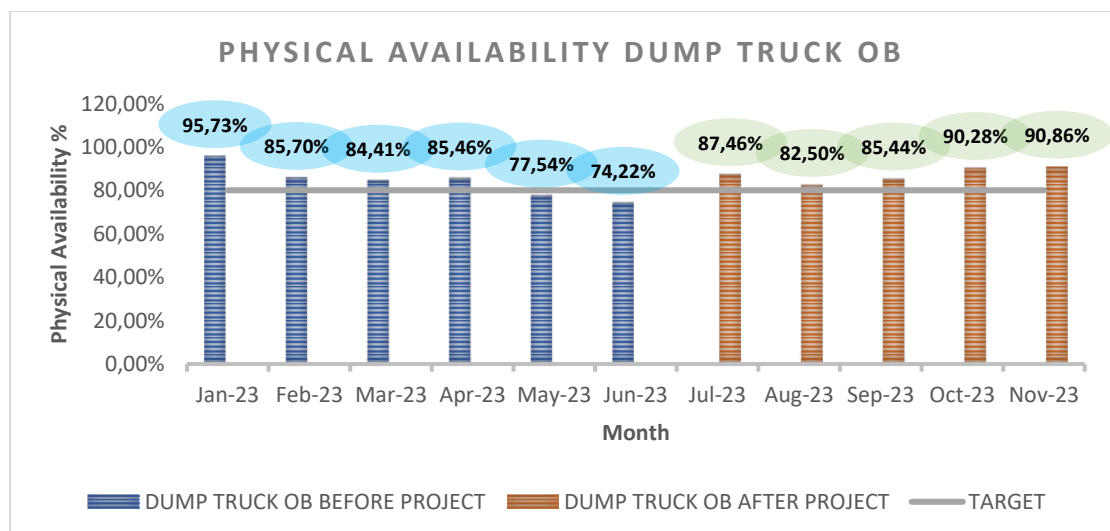


Figure 4.9 Grafik Physical Availability Dump Truck OB

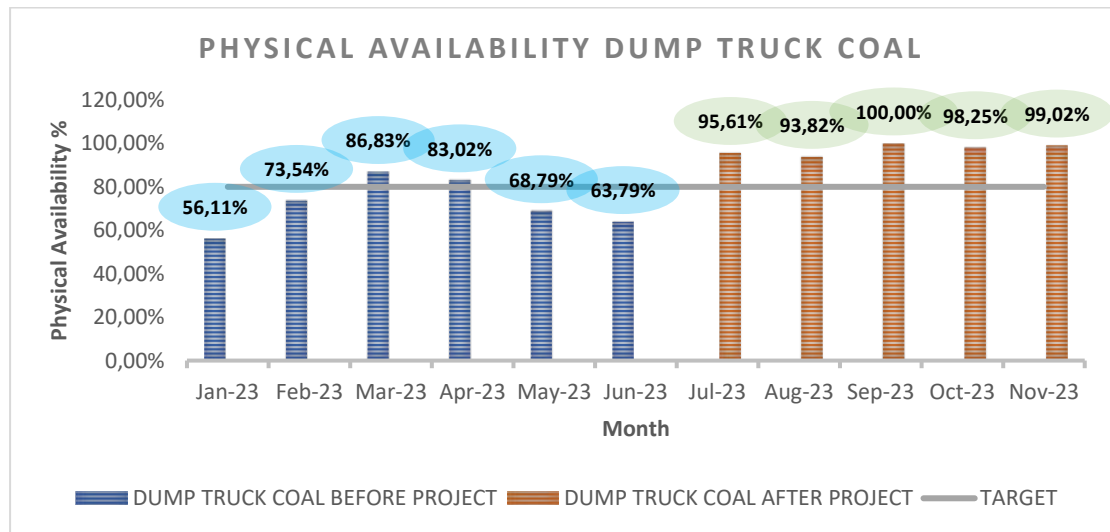


Figure 4.10 Grafik Physical Availability Dump Truck Coal

Table 4.11 Review Physical Availability Dump Truck OB and COAL

No	Category	Physical Availability (PA)		
		Before Improvement	After Improvement	Percentage GAP
1	DUMP TRUCK OB	83,86%	87,30%	3,44%
2	DUMP TRUCK COAL	71,97%	97,31%	25,34%

From figure 4.9 and figure 4.10, it can be seen that the trend of increasing physical availability, in figure 35 there is Physical and seen from table 4.11 that the physical availability of OB Dump Truck before improvement is 83,86% and after improvement it rises to 87,30% with a percentage GAP of 3,44%. While the physical availability of COAL Dump Truck before improvement was 71,97% and after improvement by 96,61% with a percentage GAP of 24,64%.

4.2.2 Calculate Overall Equipment Effectiveness (OEE)

In this study, a recalculation of Overall Equipment Effectiveness (OEE) will be carried out as in figure 4.11 and figure 4.12 below:

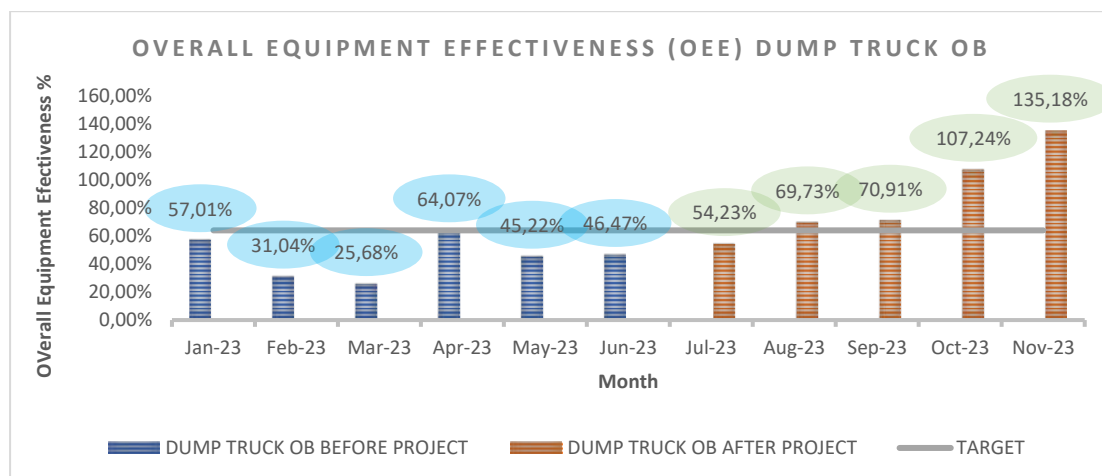


Figure 4.11 Overall Equipment Effectiveness (OEE) Dump Truck OB

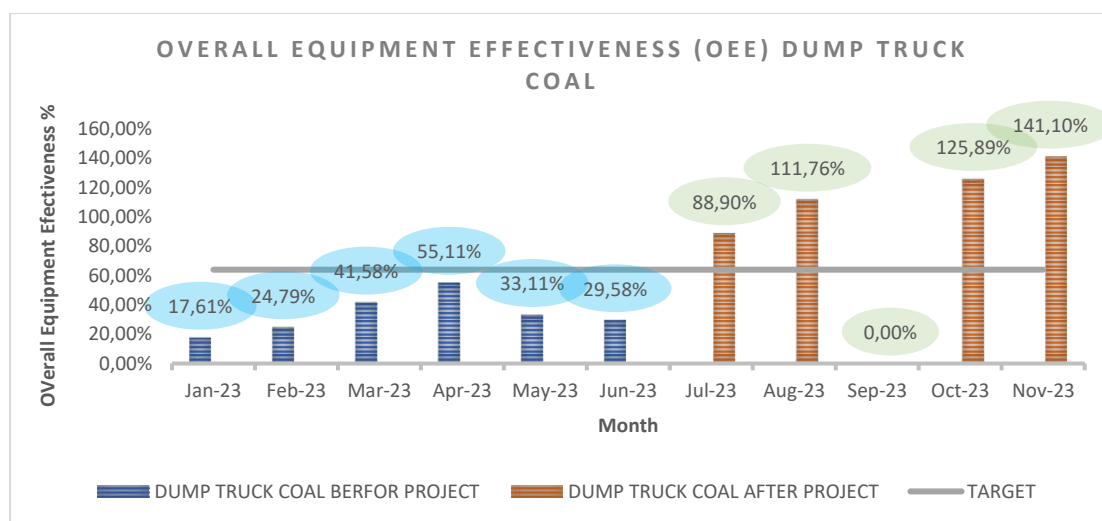


Figure 4.12 Overall Equipment Effectiveness (OEE) Dump Truck Coal

Table 4.12 Review Overall Equipment Effectiveness (OEE) Dump Truck OB and COAL

No	Category	Overall Equipment Effectiveness (OEE)		
		Before Improvement	After Improvement	Percentage GAP
1	DUMP TRUCK OB	43,86%	91,99%	48,13%
2	DUMP TRUCK COAL	32,28%	103,42%	71,14%

Figure 4.11 and figure 4.12 there is an upward trend in Overall Equipment Effectiveness (OEE). At figure 4.27, there is a value of 0% in September 2023, this is because the standby unit is waiting for a coal transport permit. Table 4.12 shows an increase in Overall Equipment Effectiveness (OEE) in OB Dump Trucks from 43,86% to 91,99% with a percentage GAP of 48,13%. Meanwhile, in Dump Truck Coal there was also an increase from 32,28% to 103,42% with a percentage GAP of 71,14%.