OPTIMIZATION OF EFFECTIVE WORKING HOURS FOR COAL TRANSPORTATION FROM ROM TO PORT: STUDY AT PT. MARUWAI COAL CENTRAL KALIMANTAN

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Abstract. Adaro Mineral Indonesia is one of the pillars of Adaro's mining business which focuses on coking coal mining in Central Kalimantan, planning to increase its coal production. The aim of this research is to optimize effective working hours for transporting coal from ROM to the port. This is done to increase the low productivity of coal transportation activities from mines to ports, which will bring benefits in the form of increased operational efficiency. This research was conducted quantitatively. The data used is primary data and secondary data. Primary data in this research was obtained from direct observations in the coal transportation area from the ROM of coal products to port, which includes cycle time, rain duration, shift changes, road conditions. The research method was carried out quantitatively. Optimization of coal transportation can be improved by improving delay parameters, improving communication between transportation operators, carrying out real time communication and data validation, expanding the Change Shift Area, fulfilling man power, making strip maps and road worthiness tests, making work plans, as well as procurement of gravel material and hauling road maintenance as well as All Weather Road conditions.

1 Introduction

Adaro Minerals Indonesia is one of the pillars of Adaro's mining business which focuses on coking coal mines in Central Kalimantan, planning to increase its coal production to 6 million tons of coal in 2024. As one of the pillars of the newly producing mine, increasing production capacity is also being carried out on a regular basis. periodically adjust to existing resources, readiness of operations and support teams in business processes. Coal hauling productivity refers to the efficiency and effectiveness of transporting coal from a mine to a specified destination, such as a port or processing facility [11]. This includes optimizing the resources, processes and logistics involved in transporting coal, aiming to maximize output while minimizing the resources expended and time required for operations. [25] Effective working hours in transportation refer to a predetermined operational period during which goods transportation activities, especially in the context of coal hauling from mines to ports or other destinations, can be utilized optimally. [11] The duration of transportation activities, including loading, transit and unloading of coal, is carried out efficiently to achieve the desired production goals. This term summarizes focused work hours dedicated to the transportation process, taking into account factors such as vehicle availability, labor productivity, scheduling efficiency, and operational effectiveness [25]. Maximizing effective work hours in transportation involves strategic allocation of resources, scheduling tasks, minimizing downtime, and ensuring efficient workflow to increase overall productivity and meet transportation goals within specified timeframes. This aims to optimize resource utilization while maintaining the quality and timeliness of delivery of the goods being transported.

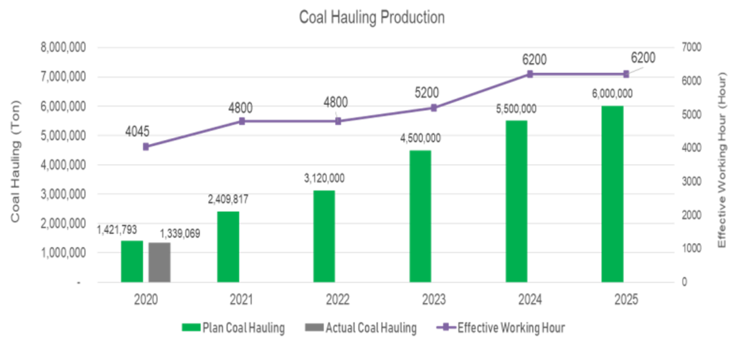

Fig. 1. Coal Hauling Production

The loss of effective working hours can have a major impact on the efficiency of coal transportation and production. Effective working hours for coal transportation are special times where transportation activities are optimally utilized to move coal from mines to ports or other destinations [11]. The loss of effective working hours directly means a reduction in the time available for transport operations. This results in a reduction in the amount of coal transported, which ultimately reduces overall productivity. Fewer operating hours means fewer deliveries are made, affecting the volume of coal moved and potentially impacting revenue generation [11]. Loss of effective working hours can cause inefficiencies and increased operational costs.

The company was unable to achieve the production plan for transporting coal from the mine to the port in 2020 as seen in Figure 1 above where the coal transportation plan in 2020 was 1,421,793 tons with effective working hours of 4,045 hours/year and the realization that could be achieved was 1,339. 069 tons. The failure to achieve the coal transportation plan from the mine to the port in 2020 is a special note for the company management to prepare itself to face the 2021 production year with a higher transportation production plan than 2020. The production plan for coal transportation from the mine to the port in 2021 is 2,409,817 tons with effective working hours of 4,800 hours. The planned effective working hours for transporting coal from the mine to the port in 2021 is 4,800 hours/year, there is a gap with the actual performance of effective working hours in 2020 for transporting coal from the mine to the port, which is 4,045 hours, which is 755 effective working hours that must be achieved in 2021 to reach 2,409,817 tons. The ultimate goal of this thesis is to optimize effective working hours for transporting coal from ROM to the port.

The purpose of writing this research is to identify obstacles that hinder efficiency and productivity in transportation operations. This identification specifically targets the obstacles that influence effective working hours in coal transportation, with a focus on road conditions, operational inefficiencies, and resource optimization, especially on the factors that have the greatest influence in hindering the efficiency of effective working hours. The research also aims to increase the low productivity of coal transportation activities from mines to ports will bring benefits in the form of increased operational efficiency. The research results aim to address the identified barriers directly. By focusing on strategy, measurement, and evaluation, this effort aims to bridge the gap between current constraints and desired productivity improvements in coal transportation.

2 Literature Review

2.1 Mine Road

According to [30] haul roads in mines are an important part of mining operations and have an important role in transporting mining materials such as minerals, coal and other bulk materials from the mine site to the processing plant or storage area (stockpile). Well-designed and maintained haul roads can significantly reduce haulage time and costs, and increase operational efficiency. Safe transportation of mining materials is the most important thing in mining operations. Transport roads should be designed to minimize the risk of accidents, such as rollovers or slides, and provide good visibility for operators to ensure safe operations [32]/

2.2 Rainfall

Rainfall is a branch of Geography, which discusses the occurrence, distribution, movement and quality of water. Rainfall science also discusses water resources and the rainfall cycle. A hydrologist generally works in the fields of earth science, environment and civil engineering [39]. In its application, rainfall science is widely used in various aspects including: the bridge design process, determining the water balance in an area, designing river bank improvement projects, calculating runoff and rainfall, providing drinking water resources, road and drainage design processes [17] reducing and predicting the risk of floods and landslides.

2.3 Cycle Time

Cycle time is the amount of time required by a mechanical device to complete one activity cycle, known as cycle time. The time of dispersal can be determined by field observations [5]. In moving materials, the work cycle is an activity that is carried out repeatedly. The main work in this activity is digging, loading, moving, unloading, and returning to the initial activity. Each activity can be performed by one tool or several tools. Increasing effective working time is done by identifying and reducing obstacles that can be avoided. These obstacles include stopping work early, taking too long breaks, personal needs of operators, and delays in shifts. The formula for loading equipment circulation time is:

$$\mathbf{CT} = t1 + t2 + t3 + t4 + t5 + t6$$

Information:
t1 = Time to take position for loading (spotting time to load).
t2 = Loading time
t3 = Load transportation time (hauling time)
t4 = Time to take position for dumping (spotting time dump)
t5 = Dumping time
t6 = Return time (returning time)

2.4 Transportation Road Planning

Transport road planning refers to the process of designing routes that will be used by transport equipment to transport mining materials from the mine to the storage area (stockpile), processing factory or to the storage area (stockpile) at the port. Haul road planning involves identifying the best route, determining appropriate width and slope, selecting appropriate materials for construction, and ensuring that the road is safe for heavy equipment operation [30]. The haul road planning process usually involves detailed mapping of the location to identify the most suitable route for the road. Routes must consider factors such as the topography of the area, the presence of water bodies, vegetation, and other obstacles that may pose challenges to construction and operation.

2.5 Haul Road Geometry

Haul road geometry refers to the physical dimensions and geometric properties of haul roads, namely roads designed for transporting heavy loads, such as minerals, coal, or other bulk materials, using large trucks or other heavy equipment [20]. The geometry of haul roads is critical to ensuring safe and efficient transport of materials, as well as minimizing wear on vehicles and the road itself.

2.5.1 Mechanical Availability

According to [19] mechanical availability in coal mining refers to the percentage of time equipment or machines are available and operational for use in the mining process. Working hours or operational time on a tool starts when the operator is inside the tool and the tool is in a ready-to-operate condition (the machine and its components are ready to run) [28]. The mechanical availability equation is as follows:

$$MA = \mathbf{W / (W+R) *100\%}$$

Information
MA = Mechanical Availability
W = Working Time
R = Repair Time

2.5.2 Physical Availability

Physical availability in the mining process refers to the percentage of time that equipment or machinery is physically available and usable for its intended purpose. This physical availability takes into account planned and unplanned downtime due to maintenance, repairs, or other problems, as well as factors such as weather, transportation, and operational constraints. The following is the Physical Availability formula :

$$PA = \mathbf{(W+S / (W+R+S)) *100\%}$$

Information
MA = Physical Availability
W = Working Time
R = Repair Time
S = Standby Time

2.5.3 Use of Availability

According to Amalia Dyah Utami (2019) the use of availability is an important thing used in mining to measure the effectiveness of equipment and machines in achieving production targets. Availability usage is the ratio or proportion of time that a tool is used to operate during the period when the tool is available and can be used (in available conditions) [28]. The following is the Use of Availability formula :

$$UA = \mathbf{(O/A) * 100\%}$$

Information :
O = operating time
A = available time

2.5.4 Effective Working Hour

Effective working hours in coal transportation refer to the productive time required by transportation equipment or personnel involved in transporting coal from the mining site to the specified destination. This hour calculation includes the duration of activities that directly contribute to coal transportation, coal loading, and the coal unloading process

2.6 Types of Delay

2.6.1 Delay Change Shift

Delay Change Shift is one of the agreed parameters of coal transportation operations where coal transportation activities experience slowdowns or delays caused by the work shift change process not being in accordance with the target time and adjustments made to the transportation transfer schedule due to unexpected disruptions or delays in the process of moving coal from the mine to the port [35]. These changes may include the timing or duration of shifts for truck drivers, equipment operators, or logistics support staff involved in coal hauling operations.

2.6.2 Delay Rain

Delay Rain is one of the agreed parameters of transportation operations where coal transportation activities are affected and cannot fulfill the specified time plan due to a slowdown or delay in the transportation process caused by quite high rainfall and affecting visibility and the level of safety of the transportation road where this matter This is related to the disruption or cessation of coal transportation from the mine to the port due to bad weather, especially high rainfall [35].

2.6.3 Delay Slippery

Delay Slippery is one of the agreed parameters of transportation operations where coal transportation activities experience slowdowns or delays due to the condition of the transportation road being slippery after rain, making it unsafe to operate [35]. This term indicates delays in the movement of coal from the mine to the port caused by slippery transport roads after rain. [11] said that the existence of slippery delays caused coal transportation to have a significant impact because coal trucks could not pass through the haul road because it was unsafe.

 https://doi.org/10.1051/bioconf/20248906002

3 Research Method

The research object is PT. Maruwai Coal. PT. Maruwai Coal is the holder of the Generation III Coal Mining Concession Work Agreement (PKP2B) which was signed by the Indonesian Government on February 19 1998 based on a letter of approval from the President of the Republic of Indonesia No. B.1/Pres/1/2000 dated 18 January 2000. The PT Maruwai Coal PKP2B area is divided into four blocks, namely Lampunut, North East Lampunut, Maruwai Miocene, and Melibu.

In accordance with the limitations of the problem, the data collection process is carried out in accordance with the data collection process. There are two types of information collected: primary and secondary. The information collected will be used to support this research. Primary data in this research was obtained from direct observations in the coal transportation area from the coal product ROM to the port which includes distribution time, rain duration, time and place of shift change, slippery roads, loading point conditions, field documentation and so on. Secondary data used in this research is supporting data from previous theories and findings related to hauling road theory.

There are two types of data collection required, namely primary and secondary data. Primary data is taken during field activities, namely the circulation time of transportation equipment and the delay time that occurs during operational time. Secondary data was obtained from company archives, official website papers and several scientific journals related to research. The secondary data needed is tool specifications, tool work efficiency, etc

4 Research Result and Discussion

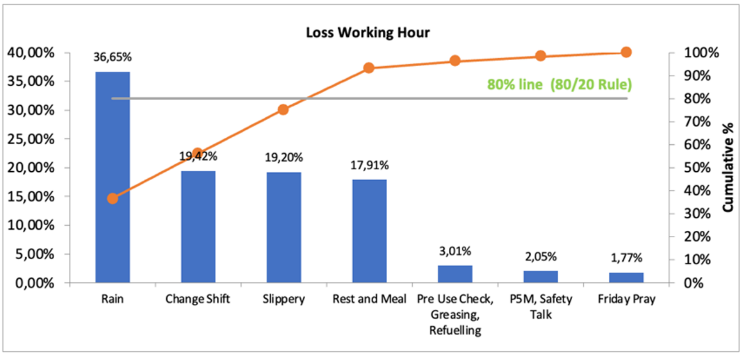

Fig. 2. Pareto Diagram of Loss Working Hour

Through data obtained from Figure 2. regarding the internal review of the PT company. Maruwai Coal in the Pareto Diagram shows that the gap in effective working hours for transporting coal from ROM to Port is 755 hours, influenced by 80.31% of Standby Hours and 19.69% of Breakdown Hours. However, the focus of this research will only examine the failure to transport coal caused by Standby Hour. In the Standby Hour study, there were 3 (three) main factors that hampered the transportation of coal from ROM to the port. The main factors that influence effective working hours include Rain (36.65%), Change Shift (19.42%) and Slippery Road (19.20%). Therefore, efforts to achieve coal transportation production targets will focus on improving these three main factors.

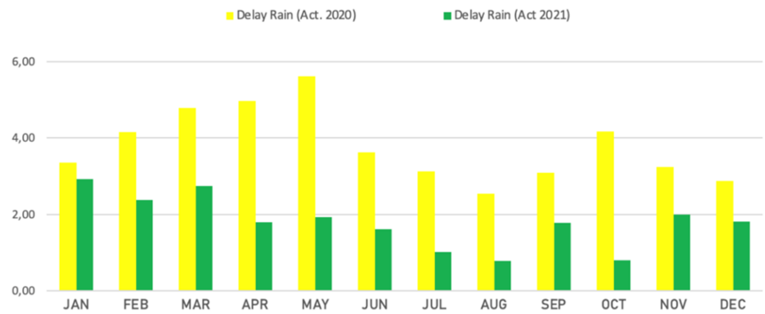

Fig. 3. Delay Rain Reduction 2021

Based on data from Figure 3. the results of the report on increasing effective working hours can be seen that in 2021, rain delays from coal transportation activities can be reduced significantly. These results show that the rain delays that occur in 2021 are lower than in 2020. This indicates that the delays experienced during coal transportation activities in rainy conditions are decreasing. This shows that the steps or improvements that have been implemented to reduce the negative impact of rain on coal transportation operations, such as submitting weather forecasts via WhatsApp Group, updating delay parameters, and resocializing time sheet data recording by operators, are able to reduce the presence of rain delays in coal transportation activities. at PT. Maruwai Coal.

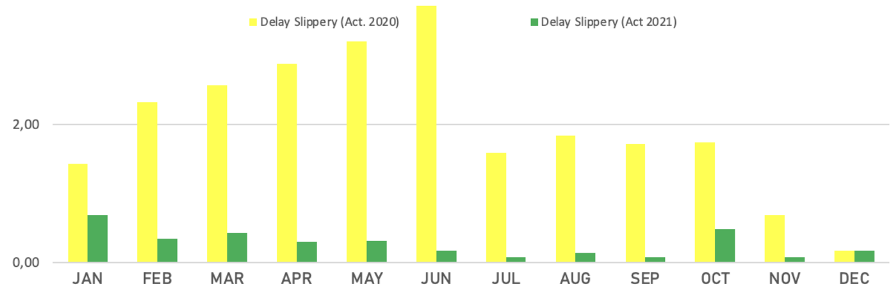

Fig. 4. Delay Slippery Reduction 2021

Based on data from Figure 4. the results of the report on increasing effective working hours can be seen that in 2021, delay slippery from coal transportation activities can be reduced significantly. These results show that the delay slippery that occurred in 2021 was lower than in 2020. This decrease in delay slippery was the result that the operational delays experienced during coal transportation activities on slippery road conditions decreased over time. Improvements have been implemented to overcome the challenges posed by slippery road conditions, making coal transportation smoother and more efficient even during rainy weather or slippery road conditions. These improvements include better road maintenance, procurement of heavy equipment and road maintenance materials, or adjustments to transport schedules to ensure safer operations during the rainy season, creation of strip maps, CHRI (Coal Hauling Road Index), roadworthiness tests and CBR tests (California Bearing Ratio), as well as the application of All Weather Road in CHR and Limited All Weather Road in SHR are able to reduce the existence of slippery delays in coal transportation activities at PT. Maruwai Coal.

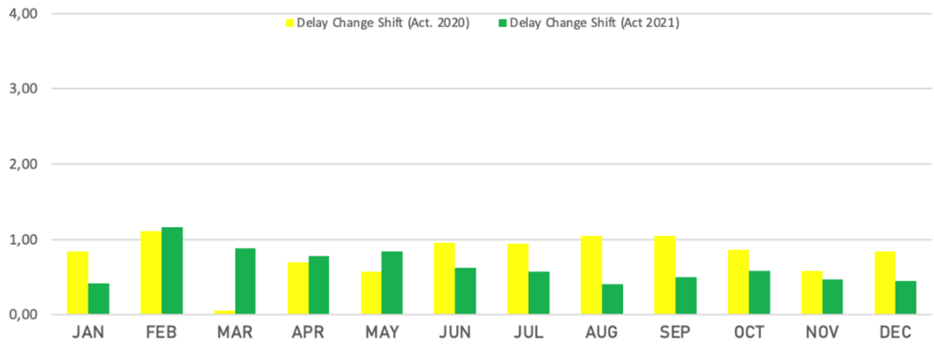

Fig. 5. Delay Change Shift Reduction 2021

Based on data from Figure 5. the results of the report on increasing effective working hours can be seen that in 2021, shift change delays from coal transportation activities can be reduced significantly. These results show that the shift change delay that occurred in 2021 can be reduced. This shows a decrease in the duration of shift changes or work shifts for coal transportation activities. PT. Maruwai Coal has implemented better shift schedules and fulfilled Man Power MCR (Mining Control Room) which is able to increase operational efficiency, reduce disruptions, or better accommodate the workforce thereby reducing shift change delays. Researchers then carried out multiple linear regression analysis on data on delay rain, delay slippery, and delay change shift on actual EWH and actual production respectively in 2021 to 2023. The data used for processing will be displayed in the research attachment. The purpose of the analysis is to find out factors that are considered capable of having the highest influence on actual EWH at PT. Maruwai Coal.

Table 1. Multiple Regression Analysis Actual EWH 2021

Coefficients[a]						
Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	440.624	70.467		6.253	.000
	Delay Rain (Act)	-.585	1.092	-.208	-.536	.607
	Delay Slippery (Act)	2.559	3.356	.280	.763	.468
	Delay Change Shift (Act)	-1.593	3.265	-.173	-.488	.639
a. Dependent Variable: Actual EWH 2021						

In the multiple linear regression model, Table 1. above shows that decreasing one unit of the delay rain variable can increase the actual EWH by 0.208 and decreasing one unit of the delay change shift variable can increase the actual EWH variable by 0.173.

Table 2. Multiple Regression Analysis Actual Production 2021

Coefficients[a]						
Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	2879909.953	532677.611		5.406	.001
	Delay Rain (Act)	-14380.999	8251.240	-.460	-1.743	.120
	Delay Slippery (Act)	-16148.606	25369.957	-.159	-.637	.542
	Delay Change Shift (Act)	-39850.613	24678.306	-.389	-1.615	.145
a. Dependent Variable: Cum. Act Prod. 2021						

In the multiple linear regression model, Table 2. above shows that decreasing one unit of the delay rain variable can increase actual production by 0.460, decreasing one unit of the delay slippery variable can increase the actual production variable by 0.159 and decreasing one unit of the delay change shift variable can increase the actual production variable. of 0.389. This conclusion shows that in 2021, the most influential aspect of increasing EWH and production is improvements in rain delay

Table 3. Multiple Regression Analysis Actual EWH 2022

Coefficients[a]						
Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	428.271	33.202		12.899	.000
	Delay Rain 2022	-.301	.226	-.291	-1.334	.200
	Delay Change Shift 2022	.073	.047	.387	1.557	.138
	Delay Slippery 2022	.001	.041	.006	.024	.981
a. Dependent Variable: EWH 2022						

In the multiple linear regression model, namely the 2022 EWH regression analysis in Table 3. above, it shows that decreasing one unit of the delay rain variable is able to increase the actual EWH by 0.291. The increase in EWH 2022 is influenced by a decrease in rain delay.

Table 4. Multiple Regression Analysis Actual Production 2022

Coefficients[a]						
Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	407384.302	45995.141		8.857	.000
	Delay Rain 2022	-621.846	312.876	-.278	-1.988	.063
	Delay Change Shift 2022	-156.539	65.225	-.383	-2.400	.028
	Delay Slippery 2022	164.470	57.248	.463	2.873	.011
a. Dependent Variable: Production Actual 2022						

In the multiple linear regression model, Table 4. above shows that decreasing one unit of the delay rain variable can increase actual production by 0.278, decreasing one unit of the delay change shift variable can increase the actual production variable by 0.383. This conclusion shows that in 2022, the most influential aspect of increasing EWH and production is improvements in rain delay.

Table 6. Multiple Regression Analysis Actual EWH 2023

Coefficients[a]						
Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	474.507	54.234		8.749	.000
	Delay Rain 2023	2.532	2.071	3.122	1.222	.276
	Delay Change Shift 2023	-2.178	1.793	-3.047	-1.214	.279
	Delay Slippery 2023	-.177	.140	-.522	-1.267	.261
a. Dependent Variable: EWH 2023						

In the multiple linear regression model, namely the 2023 EWH regression analysis in Table 6. above, it shows that decreasing one unit of the delay change shift variable is able to increase the actual EWH by 3.047. Meanwhile, decreasing one unit of the slippery delay variable can increase the actual EWH by -0.522. The increase in EWH 2023 is influenced by a decrease in shift change delay and slippery delay.

Table 7. Multiple Regression Analysis Actual Production 2023

Coefficients[a]						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	478326.162	64288.315		7.440	.001
	Delay Rain 2023	2121.523	2455.292	2.131	.864	.427
	Delay Change Shift 2023	-2207.961	2125.491	-2.517	-1.039	.346
	Delay Slippery 2023	-117.948	165.951	-.283	-.711	.509
a. Dependent Variable: Production Actual 2023						

In the multiple linear regression model, Table 7. above shows that decreasing one unit of the delay change shift variable can increase actual production by 2.517, decreasing one unit of the delay slippery variable can increase the actual production variable by 0.283. This conclusion shows that in 2023, the most influential aspect of increasing EWH and production is improvements in shift change delays. The data obtained to see the factors that influence EWH and production in 2023 is data recorded in January - September 2023. Therefore, there are differences in regression results in 2021-2022 when compared to 2023. In 2021- In 2021, the factor that stands out and is able to have the biggest influence on increasing EWH and production is rain delay. Meanwhile, in 2023, the factor that will contribute to increasing EWH and production is the shift change delay. This difference occurs because the analysis carried out in 2023 did not include the results of observations from October – December 2023, where these months are months with high rainfall.

In 2020, actual rain delays at PT. Maruwai Coal are 1,384 hours/year. The findings in Table 4.16 show that PT. Maruwai Coal was able to reduce rain delays to only 653 hours in 2021. This shows the efforts of PT. Maruwai Coal to reduce rain delays to optimize coal transportation has been achieved. In 2020 delay slippery at PT. Maruwai Coal is 725 hours/year. The realization carried out, PT. Maruwai Coal is able to reduce delay slippery to 97 hours in 2021. This shows the efforts of PT. Maruwai Coal to reduce slippery delays to optimize coal transportation has been achieved. In 2020, delay change shift at PT. Maruwai Coal is 288 hours/year. The realization carried out, PT. Maruwai Coal was able to reduce shift change delays to only 232 hours in 2021. This shows the efforts of PT. Maruwai Coal to reduce shift change delays to optimize coal transportation has been achieved.

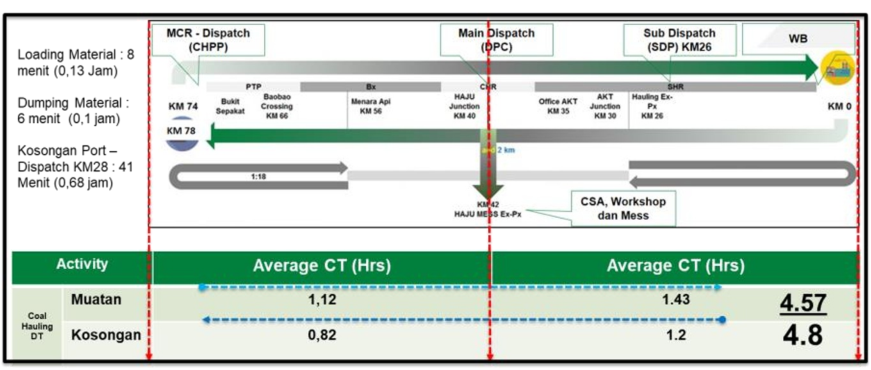

Fig. 6. Cycle Time Improvement

Figure 6. calculates the average cycle time value for January 2021 to December 2021 from actual data obtained from field observations as well as PT Maruwai Coal archive data. Calculations for theoretical productivity of loading and conveying equipment use the equation:

$$P = \text{Average CT With Cargo} + \text{Average CT Without Cargo}$$
$$P = (1.12 \text{ hours} + 1.43) \text{ hours} + (0.82 \text{ hours} + 1.2 \text{ hours})$$
$$P = 4.57 \text{ hours / cycle}$$

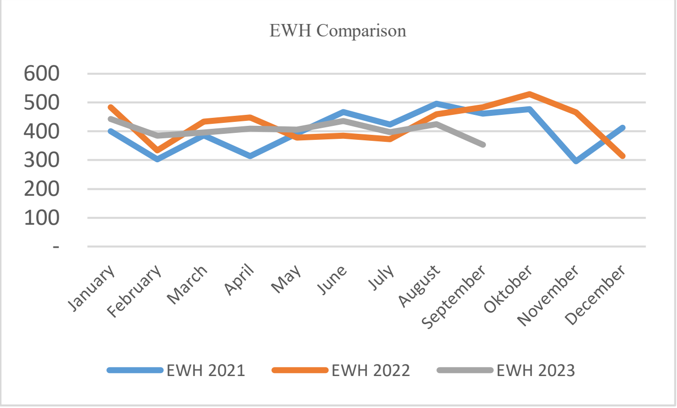

Fig. 7. EWH Comparison

The results related to the comparison of EWH in 2021, 2022 and 2023. The vertical axis in this graph shows the magnitude of the EWH value. The results of the implementation of increasing effective working hours were carried out in 2021. As shown in Figure 7. in 2022 and 2023 effective working hours from PT. Maruwai Coal tends to increase from 2021 except in the July – August period. This shows that improvements to the implementation of increasing effective working hours carried out in 2021, which are currently still being implemented, are considered successful in helping PT. Maruwai Coal increases the effectiveness of its work.

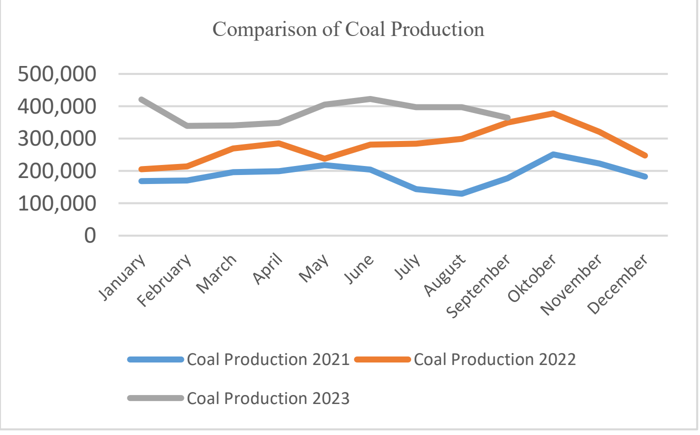

Fig. 8. EWH Comparison

Figure 8. shows the results regarding the comparison of coal production in 2021, 2022 and 2023. The results show that every year since 2021 there has been an increase in coal production at PT. Maruwai Coal. This shows that improvements to the implementation of increasing effective working hours carried out in 2021, which are currently still being implemented, are considered successful in helping PT. Maruwai Coal increases its coal production

5 Conclusion and Suggestion

5.1 Conclusion

Based on the results of the discussion and analysis carried out, the conclusions of this research are as follows:

1. Things that contribute to effective working hours and influence the failure to achieve production plans for transporting coal from ROM to the port are change shift delays, slippery delays, and rain delays.
2. The following are strategies and results of implementation to increase the productivity of effective working hours for transporting coal from ROM to the port. In improving delay slippery PT. Maruwai Coal improving delay parameters, improving communication between transport operators, carrying out real time communication and data validation, expanding the Change Shift Area, fulfilling man power, making strip maps and road worthiness tests, making work plans, as well as procuring gravel material for road maintenance, extending leases heavy equipment units and all-weather road applications. This effort has reduced slippery delay from 725 hours to 97 hours. Delay Change Shift Strategy to improve delay parameters, improve communication between transport operators, carry out real time communication and data validation, expand the Change Shift Area, fulfil man power Reduce change shift delay from 288 hours to 232 hours. Delay Rain Strategy for making strip maps and road feasibility tests, making work plans, as well as procuring gravel material for haul road maintenance and extending the rental of heavy equipment units for road maintenance as well as submitting all weather roads. Reduced rain delay from 1,334 hours to 653 hours.
3. In 2020, coal transportation production from ROM to the Port reached 1,337,969 tons. In 2021 there will be an increase in coal transportation production reaching 2,265,781 tons. This comparison shows a fairly large increase in coal transportation operations from ROM to the Port during one year. Apart from that, effective working hours have also increased from year to year. In 2020, the average effective working hours were around 4,044.99 hours, while in 2021, the figure increased to 4,812.76 hours

5.2 Suggestion

Based on the results of the discussion and analysis carried out, the suggestions that can be given are as follows:

1. Optimization must be carried out continuously followed by evaluations carried out periodically so that the data and adjustments made can be determined accurately through data in the field (change shift delay, rain delay and slippery delay). Data collection is carried out intensively and periodically to ensure that the Key Performance Indicators and standardization set by the company are met.

2. In 2021 there has been a decrease in change shift delays from 288 hours to 232 hours. Companies need to continue to evaluate the consistency, implementation and best practices of changing work shifts, because there is still an opportunity to continue reducing shift change delays to optimum hours.
3. Companies must pay attention to other factors that also influence the optimization of coal transportation, such as safety aspects and work standardization. This was due to obstacles discovered when the research was conducted due to an incident that required the company to stop coal transportation operations for 2 (two) weeks.
4. Technical studies or further studies need to be carried out to improve the quality of the coal transport road from ROM to the Port using asphalt or chip seal or other visible methods, so that all segments of the coal transport road become an All-Weather Road,

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