CHAPTER 1
INTRODUCTION

1.1 Research Background

PT XX is one of the coal mining contractor companies in Indonesia, where its core business activity is focused on providing an extensive mining services including professional mining contracting and heavy equipment rental. Because of its advantageous position in a significant coal-producing area, PT. XX is able to assist the operations of its parent business and meet the wider demands of the regional mining sector.

Driven by a clear goal and vision in the forefront, PT. XX is dedicated to increase its profitability, fostering self-reliance culture, and being a reliable industry of mining solutions. With the intention of securing its own financial stability and supporting their partners towards excel, their company's business strategy is built to offer a dependable and effective services in coal mining sector. Amid this highly competitive mining services market, PT. XX is hoping to establish a high standard and professional services by utilizing their experience and strong fleet of heavy machineries.

Mining contracting services are the main business of PT. XX which forms the core of its operational procedures. Start from coal hauling and reclamation to land clearance and overburden removal, all of those contracts cover a broad range of task necessary for mining operations. To complete these contracts with an excellent performance, the company makes use of its technological know-how and a sizable fleet of contemporary heavy machinery. PT. XX provides equipment rental such as excavators, bulldozers, and haul trucks as an additional service aside from full-service contracts, giving other company that require a specialized machinery for their own business.

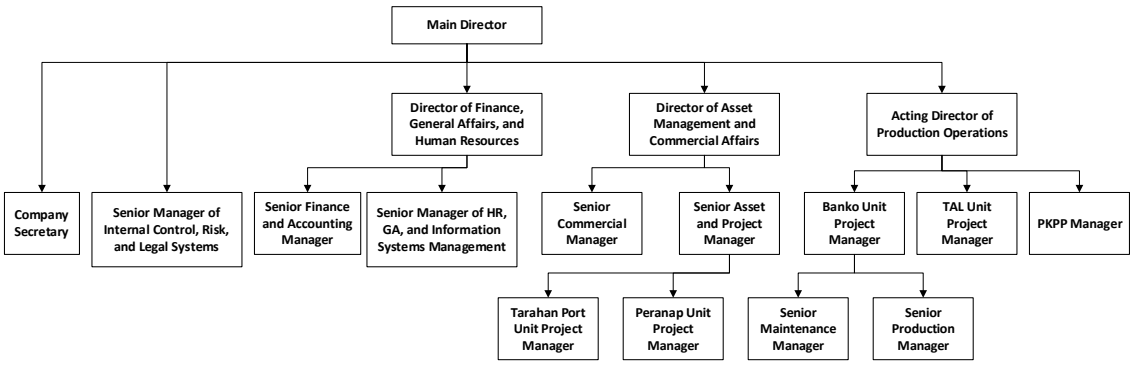


Figure 1.1 Organizational structure

Figure 1.1 shows the organizational structure of PT XX. The organizational structure of PT. XX is headed by a President Director who supervises several key divisions, including Finance and Human Resources, Asset and Commercial Management, Risk and Legal, as well as Production Operations. Each division is managed by senior managers overseeing respective functional areas such as finance, accounting, human resources, asset management, and production. Furthermore, the company appoints several project officers responsible for managing operations in various project areas.

The workforce in PT. XX is a critical asset. Comprised of both technical and administrative personnel who contribute directly to the company's success the majority of the workforce consist of skilled heavy equipment operators and site technicians who work directly on mining projects. These workers are responsible for the safe and efficient operation and maintenance of the company's machinery. Supporting them are the administrative staff in various departments who handle planning, finance, human resources, and other essential functions. Together, this diverse team ensures that all projects are completed on schedule, within budget, and to the high standards expected by clients, ultimately contributing to the company's profitability and reputation as a trusted partner.

1.2 Problem Exploration

In PT. XX, the problems were identified through interviews with the stakeholders within different departments which are engineering, maintenance department, production and performance management, and production department. In production and performance management, and production department (PKPP), the problem is that the dashboard to show the summary of data are not optimal yet based on the worker's opinion. The example of the dashboard can be seen in Figure 1.2.

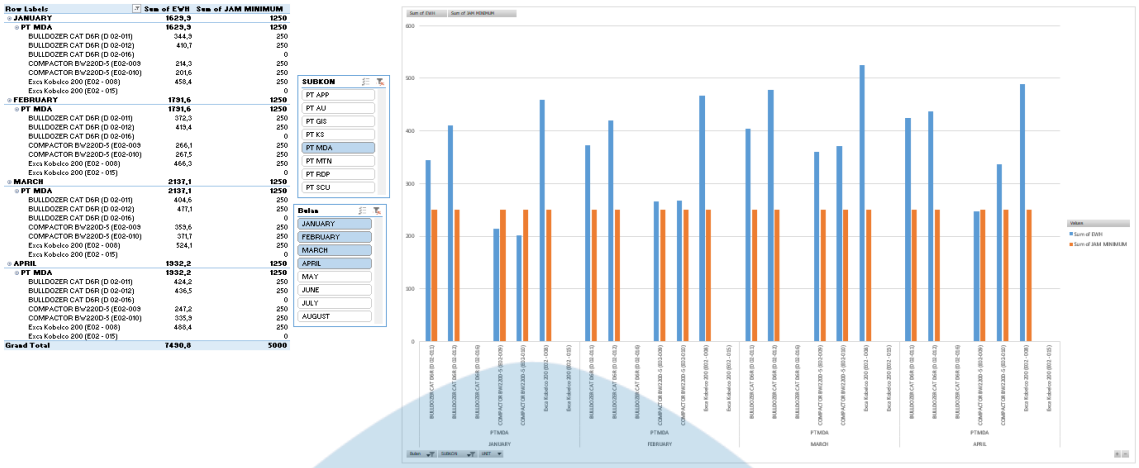


Figure 1.2 Dashboard in PKPP

Based on Figure 1.3, the dashboard has not yet included the option or visualization for the factors that affect the data in a certain period. The placement of the data and chart are also not efficient yet, leaving many empty spaces and leading to lack of dashboard compactness.

The engineering department is responsible for monthly production plans, field surveys, mine design, and preparation of the post-mine land reclamation process. In the engineering department, the problem found was the non-achievement of the production target of overburden in the previous period with a target of 4,600,000 but the actual production was only 4,495,216 BCM, which is about 98% of the target. In addition, there is a problem of delaying mining activities due to the pit being flooded with rainwater. The number of productions here is still the total production for main company, which combined the production from all the contractors including PT. XX. The actual production of PT. XX that does not met the requirements may be covered by another contractor, but PT. XX will be fined for the gap in production that did not met the target.

The maintenance department has full responsibility for the entire process of repairing equipment used in the mine area. This task includes scheduled repairs according to a routine maintenance plan, as well as unexpected repairs in the event of a sudden breakdown. The maintenance department also plays an important role in maintaining the lifespan of equipment, increasing work efficiency, and supporting the overall smooth production. Figure 1.4 shows the actual condition of maintenance department in site, where some of the fleets will go to workshop for scheduled maintenance.

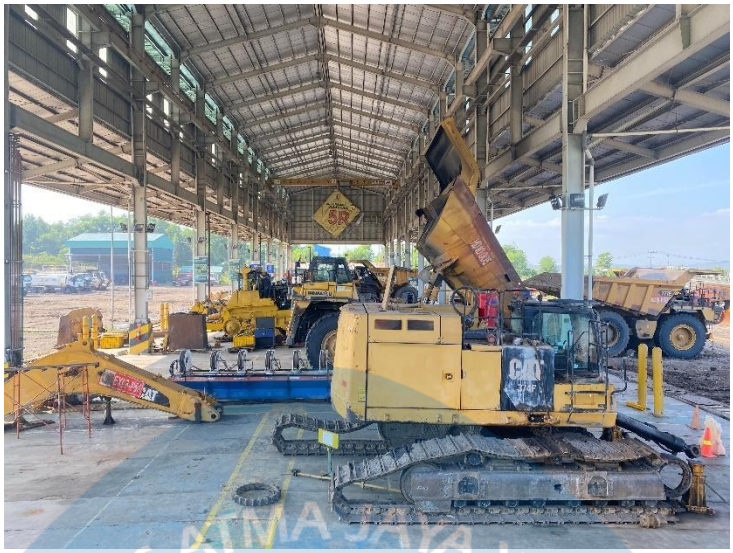


Figure 1.3 Maintenance workshop

From the interview with the worker from the maintenance department, the problem is about the value of Physical Availability (PA) which is less than optimal. Physical Availability shows the percentage of time that heavy equipment, such as an excavator, dump truck, or bulldozer, is in operation-fit condition and is not damaged or in the process of repair. The average percentage of PA for each type of tool can be seen in Table .

Table 1.1 Physical availability achievement in August 2025

Equipment Type	PA
Track	46%
Wheel	73%
Hauling	76%
Support	93%

The percentage of PA is influenced by various factors such as Mean Time Between Failures (MTBF). MTBF is the average time range of the occurrence of equipment damage before and after. The greater the MTBF value, the better it will be because it indicates that the damage to the tool does not occur in a quick time. From the data obtained, the MTBF of the fle*et al*so has the problem of not achieving the target with actual targets. The MTBF achievements for 2025 in hours can be seen in Table .

Table 1.2 MTBF 2025 in hours

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
MTBF	53	40	38	41	44	47	53	61
PLAN MTBF	72	72	72	72	72	72	72	72

According to Table 1.2 above, the target plan for MTBF is 72 hours. However, from the period from January to August, the actual MTBF value did not reach the target. This means that the time between events between damages is shorter than planned, resulting in a low PA value.

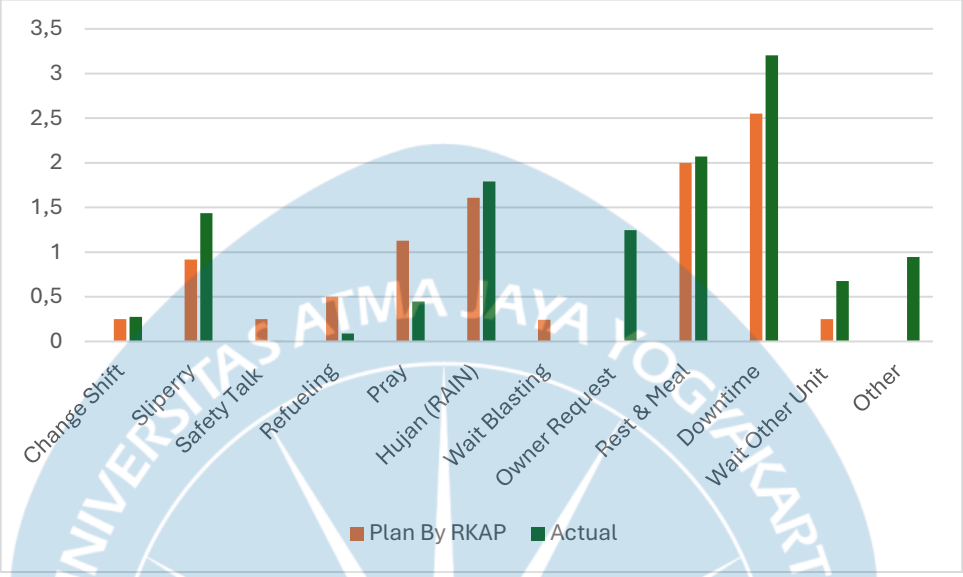


Figure 1.4 Loss time August 2025

Figure 1.4 shows the loss time that occurred in August 2025. The orange bar indicates the time plan that should be used, while the green bar indicates the actual time used. The smaller the actual value than the plan, the better it is because the less lost time that occurs. This loss time is affecting the utilization in production activity. The production department's output is low and has not met initial estimates. The main reasons include physical availability, productivity, and Effective Working Hours (EWH). This issue occurs within the Production Department, and the data have been processed and analyzed by the Production Performance and Project Management Department (PKPP).

Table 1.3 Summary of loss time in 2023

summary 2023	
Loss time	**Hour**
Slippery	13,177
Hujan (RAIN)	28,480
Downtime	30,860
EWH	137,405
Percentage 2023 to total loss time	
53%	

Table 1.4 Summary of loss time in 2024

Summary 2024	
Loss time	**Hour**
Slippery	15,194
Hujan (RAIN)	28,750
Downtime	18,298
EWH	132,430
Percentage 2024 to total loss time	
47%	

Based on the summary of loss time shown in the Table 1.3 and Table 1.4, there are three main contributors to loss time that recurring. The loss time are caused by environmental factors and equipment stoppage namely slippery road conditions (road conditions after rain), the rain itself, and fleet downtime. In 2023, it is shown that the loss time from these three main contributors have reach 53% of the total loss time happening. In 2024, the total loss time values contribute to 47% of the total loss time. It indicates that nearly half of the loss time contributors is consistently associated with weather-related factors and fleet downtime and it's making them the critical drivers of reduced utilization and effective working time.

Accordingly, when the total loss time is mostly driven by weather-related factors and fleet downtime, then the available operating window will be reduced and the EWH cannot be maximized. This repeatedly occurring conditions directly explains why the production performance can deviate from the planned target.

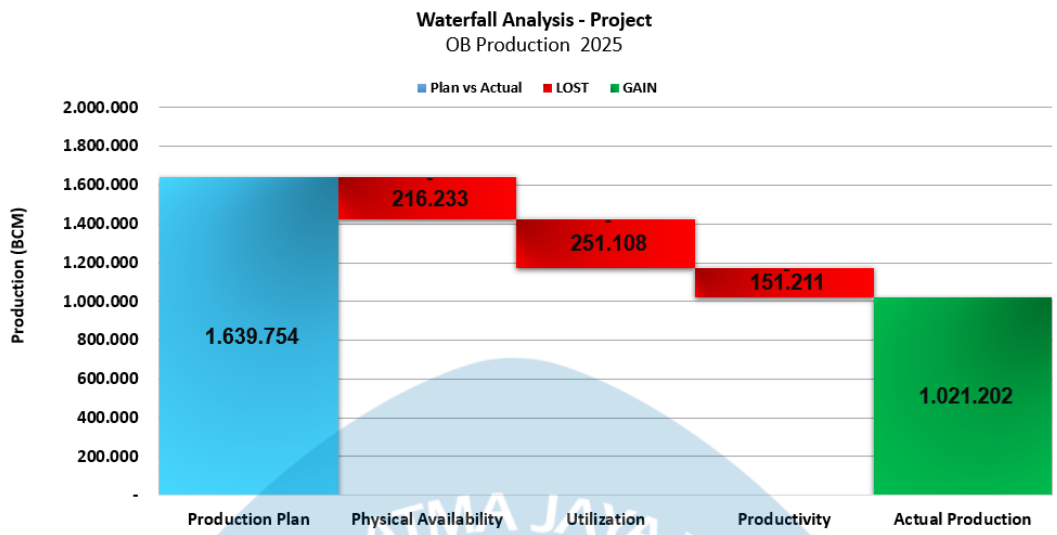


Figure 1.5 Production Loss Chart

Figure 1.5 shows the lost happen in the actual production compared to the production plan based on three factors. The production target and achievement here is specifically from PT. XX in August 2025 as the example. The production plan target, showed by blue bar, is around 1.6 million BCM, but the actual production showed by green bar only achieved around 1 million BCM. The lost can be seen in the red bars with different factors that included Physical Availability, Utilization, and Productivity. This shows that the problem of low physical availability in maintenance department and utilization in production department influence the lost in actual production.

Table 1.5 below is presenting the summary of problem observations identified across several departments within the company. Each problem was gathered through discussions and observations conducted with the respective department representatives. The table outlines the department name, the person in charge or respondent, and a brief description of the main issues identified.

Table 1.5 Problem observation summary

Number	Department	Name	Problem
1.	Production Performance and Project Management	Mr. PKPP1	There is an issue in PKPP Department in dashboard section. The main issue with the current dashboard is that it lacks visualization of the factors influencing performance and has an inefficient layout that reduces its overall effectiveness and compactness.
2.	Engineering	Mr. ED1	The overburden target was achieved at only 98% and needs to be optimized to reach 100% in order to maximize profit.
3.	Maintenance	Mr. MD1	The target MTBF is 72 hours, which has not been achieved yet. This issue affects the value of Physical Availability (PA). The MTBF target needs to be achieved in order to improve the PA value.
4.	Production	Mr. PD1	The problem faced by this department is the high loss time in several activities compared to the planned target (RKAP). This issue needs to be addressed in order to reduce the loss time

From the Table 1.5 the type of main problem is categorized based on the relationship with each other.

Table 1.6 Problem summary

No.	Main Problem	Factors
1.	Dashboard is not effective	• No option for factors visualization • Empty space leaving gap on the visualization
2.	Target of production is not achieved because of low effective working hours	• Low Physical Availability • MTBF is not achieved • Loss time

Table 1.6 shows that the main problem is now categorized into two problems. The previous problems from Engineering, Maintenance, and Production Department are connected to each other where the main problem is that the target of production is not achieved. The problem for dashboard is not considered an urgency because it did not have much impact on actual production and only impact presentation of the data. Based on the observations and data in Table 1.1-Table 1.4 and Figure 1.4-Figure 1.5, the inability to achieve the overburden production target is mainly driven by equipment-related performance, especially low MTBF and long MTTR that reduce the Physical Availability (PA) and increase loss time. Therefore, in this project, the main problem is narrowed down to the ineffective maintenance system that causes low MTBF and high MTTR of critical fleets, which in turn leads to production target not being achieved.

1.3 Problem Statement

The main problem addressed in this project is failure to achieve the planned production target.

1.4 Objective

The objective of this project is to design a fleet management system for PT XX's mining fleet so that physical availability and effective working hours will increase. This will increase the actual number of productions that can be achieved. The Critical Success Factor (CSF) in this study is to increase the Bank Cubic Meter BCM achievement target to 90%.

1.5 Scope and Limitation

Limitations of this project are as follows:

a. There is a limitation to some problems where the main issue lies in people, so there is no technical solution for these cases.
b. There is a limitation of money and resources, so the proposed solution will not include the idea that needed a huge amount of money.
c. The duration of data collection and observation is limited from August 2025 to February 2026.

d. The designing process runs in a parallel system, so there are variables that cannot be simulated.