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THE EFFECT OF PREVENTIVE MAINTENANCE, TRAFFIC MANAGEMENT, TECHNOLOGY AND COMMUNICATION SUPPORT AND OPERATOR CARE ON OSH PERFORMANCE TRANSPORTATION OF TRUCK UNITS IN THE MINING SERVICE COMPANY PT. XYZ

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ABSTRACT

This study aims: To determine the direction and strength of the effect of preventive maintenance on the performance of K3 transportation at Mining Service Company PT. To determine the direction and strength of the influence of traffic management on the performance of K3 transportation at the PT. To determine the direction and strength of the influence of technology and communication on the performance of K3 transportation at the PT XYZ Mining Service Company. This research is descriptive quantitative. The population in this study were 2145 workers and staff working in the construction service company PT. The sampling technique in this study is the saturated sampling technique, the samples taken are 145 workers and staff who work in the construction service company PT. The results of this study indicate that: There is an effect of preventive maintenance on the performance of K3 transportation. There is an effect of traffic management on the performance of K3 transportation. There is an effect of technology and communication support on the performance of K3 transportation. There is an effect of operator concern on the performance of K3 transportation.

Keyword: Maintenance, Preventive Maintenance, Traffic Management, Technology and Communication Support, Operator Maintenance, OHS Transportation Performance

1. INTRODUCTION

Mining is one of the industrial sectors that can provide substantial foreign exchange for the country. Indonesia is a country with large coal reserves, where reserves in Indonesia currently reach 38.84 billion tons. The age of coal reserves in Indonesia is still 65 years with an average production of 600 million tons. (ESDM Press NUMBER: 246.Pers/04/SJI/2021 Ministry of Energy and Mineral Resources). More and more large plantation companies are engaged in oil palm plantations, the competition between these large plantations is getting tougher. The moratorium on oil palm plantation

permits as stipulated in Presidential Instruction Number 8 of 2018 (Cabinet Secretariat of the Republic of Indonesia, 2018) dated 19 September 2018 concerning Suspension and Evaluation of Oil Palm Plantation Permits and Increasing Productivity of Oil Palm Plantations which is valid for 3 (three) years makes companies Oil palm plantations cannot get permits to add new land, so it will be difficult for oil palm plantation companies to expand. This encourages oil palm plantation companies to increase the productivity of oil palm plantations on plantation lands that are currently controlled.

According to Kirk-Othmer (2000), effective and efficient mining business management includes lower capital expenditure, smaller workforce, focus on safety culture, access to competitive financing, lower mining costs, flexibility in mining equipment and plans. , total integration of mining teams, risk sharing, align business direction, can share capital to spend on business development opportunities such as acquisitions and exploration, less industry problems and can lead to continuous improvement strategies.

Table 1. Heavy Equipment Involved in PT XYZ

BERDASAR ALAT YANG TERLIBAT		
Alat Yang terlibat	Jumlah	Persentase
DT Tronton Coal	32	28%
Exca	24	21%
OHT	23	20%
LV, Bus, Man Haul	8	7%
Water Truck	5	4%
ADT	5	4%
Dozer	4	4%
Grader	3	3%
Fuel Truck	3	3%
hammer)	2	2%
Genset	2	2%
Service / Lube Truck	2	2%
DT Tronton OB	1	1%
Total	114	100%

Source: PT. Data Laporan XYZ, 2021

The use of heavy equipment at work plays an important role in terms of speed and acceleration in construction projects. The value of the effectiveness of using heavy equipment such as excavators, dump trucks, wheel loaders and motor graders can be assessed from the productivity of these tools. Thus, planning for the selection of heavy equipment must be carried out carefully and precisely so that the effectiveness of using heavy equipment is optimal. One of the characteristics of the mining industry is High Risk. The use of high-tech equipment that operates 24 hours, and involves many facilities and infrastructure. Safety in the mining sector is one of the points of concern to be managed properly.

The core process in coal mining includes several activities as shown in the following figure:

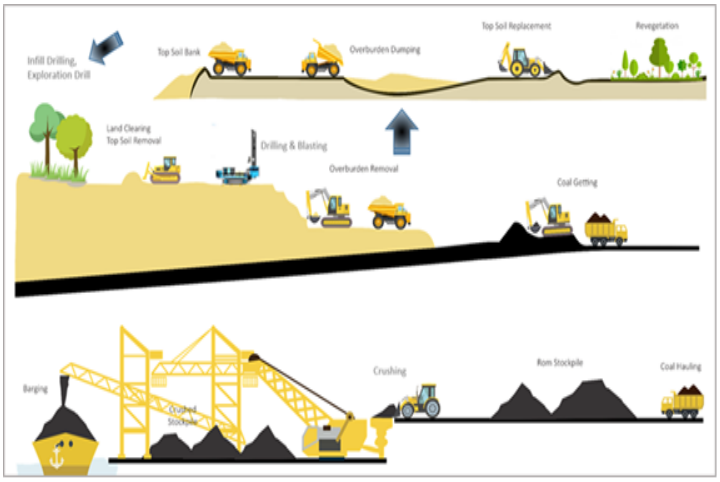

Figure 1. Coal mining process sequence (open pit)

1. Land Clearing, Land Clearing is the process of clearing forest to be prepared for new mining areas. The process of land clearing is in the form of felling trees around the area, clearing up to the roots, and burning forests.
2. Peeling the top soil (Top Soil)
3. Top Soil Removal, Is the original stripping activity that will be moved to a predetermined area (Soil Bank).
4. Drill and Blast, Drilling is the first activity carried out in rock blasting operations. This activity aims to make a blast hole which will later be filled with a number of explosives to be detonated later. Blasting is a blasting activity to break up a mass that is at rest and has difficulty breaking down or breaking.
5. Excavation and Overburden Removal: It is an activity that starts from the blasting process in the mining area and then transports the overburden material called overburden using an excavator excavated tool and then transported it using heavy equipment, namely heavy duty trucks to the disposal area.
6. Coal Getting, Is the taking of coal in the PIT area which is ready to be loaded.
7. Coal transportation, is the transportation of coal from the PIT area to the storage area.
8. Crushing, Is the process of adjusting the size of coal according to customer demand.
9. Barge, is the process of loading coal into a transport ship.

All of the coal mining processes mentioned above use heavy equipment in their operations. Types of heavy equipment units used include Excavator, Bull Dozer and OHT (off highway truck). Poor management of mining equipment can result in the set targets not being achieved. Continuous use of heavy equipment units can shorten the life of the unit, resulting in production delays and increased repair costs. In an effort to maintain the performance of heavy equipment units, a system for inspection, maintenance and testing of heavy equipment units is required according to the standards set by the manufacturer. In line with previous research proposed by Alen et al. (2017), the results of designing an information system can facilitate the implementation of maintenance management and related data management. The availability of data recapitulation of damage and machine maintenance helps the head of the factory to make decisions regarding maintenance activities such as the types of components needed and the cost of repairing machines.

In supporting the activities of the Coal mining process, apart from heavy equipment units used as production equipment, the supporting units also have a very important role in supporting the smooth operation of the mining process. Supporting units used include the following:

1. Fuel Truck
2. Water Truck, and

3. Light Vihicle

Table 2. YTD Performance Index 2021

Num	Indicator	Jul		Aug		Sep		Oct		Nov		Des	
		Actual	Theshold	Actual	Theshold	Actual	Theshold	Actual	Theshold	Actual	Theshold	Actual	Theshold
1	Death	0	0	0	0	0	0	0	0	0	0	0	0
2	KAPTK	0	0	0	0	0	0	0	0	0	0	0	0
3	Public Complain	0	0	0	0	0	0	0	0	0	0	0	0
4	TIFR	0,22	0,22	0,41	0,22	0,20	0,06	0,09	0,22	1,12	1,12	0,00	0,00
5	PDFR (dalam bahasa Inggris)	2,30	3,00	2,85	3,00	2,84	5,53	1,84	3,00	0,00	n/a	0,00	0,00
6	Pak	0	0	0	0	0	0	0	0	0	0	0	0
7	Environment Accident	0	0	0	0	0	0	0	0	0	0	0	0

Source : PT. Report Data, XYZ, 2021

Based on the background of the above problems that PT XYZ in the observations examined by researchers, there are still problem factors such as the increasing frequency of mining accidents involving support units, the absence of an adequate system for maintenance and repair of trucks in accordance with the manufacturer's needs on a regular basis, the implementation of the system comprehensive mining safety management related to mining facilities, infrastructure, equipment installation (SPIP).Rumusan masalah dalam penelitian ini adalah sebagai berikut :

1. Does preventive maintenance have a significant effect on the performance of K3 transportation in the Mining Service Company PT. ;
2. Does traffic management have a significant effect on the performance of K3 transportation in the Mining Service Company PT. XYZ
3. Does the support of technology and communication have a significant effect on the performance of K3 transportation in the Mining Service Company PT. XYZ
4. Does operator concern have a significant effect on the performance of OHS transportation in the Mining Service Company PT. XYZ

Based on the formulation of the problem, the research objectives are;

1. To determine the direction and strength of the effect of preventive maintenance on the performance of K3 transportation at the Mining Service Company PT.XYZ
2. To determine the direction and strength of the influence of traffic management on the performance of K3 transportation in the Mining Service Company PT. XYZ
3. To determine the direction and strength of the influence of technology and communication on the performance of K3 transportation in the Mining Service Company PT. XYZ
4. To find out the direction and strength of the influence of operator concern on the performance of OHS transportation in the Mining Service Company.

2. LITERATURE REVIEW

Maintenance is also defined as an activity to maintain or maintain factory facilities or equipment and make necessary repairs or adjustments and replacements so that there are satisfactory production operating conditions according to what is planned. It can be concluded that maintenance activities are carried out to maintain or repair equipment in order to carry out production activities effectively and efficiently with quality product results. The maintenance system can be seen as a shadow of the production system, where if the production system operates at a very high capacity, its maintenance will be more intensive (Ahmadi & Hidayah, 2017). The maintenance system itself includes repairing damaged mechanical and electrical equipment (Ngadiyono, 2010). Maintenance is a combination of various actions taken to save item II-2 or repair it to an acceptable condition (Corder dalam Sari & Ridho, 2016).

Maintenance is an operation or activity that must be carried out periodically with the aim of replacing damaged equipment with existing resources. Maintenance is also aimed at returning a system to its proper condition so that it can function properly, extending machine life and minimizing failures as much as possible. Maintenance management can be used to make policies regarding maintenance activities, by involving technical aspects and management controls into the maintenance program. In general, the higher the repair activity in a system, the more important the need for maintenance management and control becomes (Kusnadi & Taryana, 2016). Self-care according to Kurniawan (2013) in Setiawan (2016: 8) is an activity carried out in an industry to maintain or increase the carrying capacity of the machine during the production process. Production machines that are used continuously will experience a decline, because they need maintenance. Optimal maintenance must be carried out continuously and periodically so that the machine can function optimally.

Maintenance is very important so that the machine is always in good condition and ready for use. Maintenance is a function that monitors and maintains factory facilities, equipment, and work facilities by designing, managing, handling, and inspecting work to ensure unit functions during working time and minimize downtime caused by damage or failure. Repair (Manzini, 2010). According to Ngadiyono (2010), every type of maintenance activity should have a purpose. In general, the purpose of maintenance is to maintain the condition and or to repair the machine so that it can function in accordance with business objectives. The conditions received are in accordance with the machine that is able to produce products according to standards, namely meeting the tolerances of shape, size and function. However, in general, the main objective of maintenance is to ensure optimal availability of the right equipment to fulfill the planned production activities and the production process can obtain maximum return on investment. Extends the productive life of machines in the workplace, builds and all that is in them. Ensure availability of all necessary equipment in initial condition. Ensure the safety of everyone inside and using the facility.

According to Jono (2015) the main purpose of the maintenance system is to prevent a machine from being seriously damaged, so it does not take a long time and is also too expensive to carry out maintenance. So that the machine can operate as much as possible and production activities run smoothly and get a quality product output. The main principle of the maintenance system consists of two things, namely: Suppressing (shortening) the breakdown (breakdown) period to a minimum by considering economic aspects. Avoid unplanned damage, sudden damage. According to Subana & Sudrajat (2011) The form of treatment policy is as follows:

a. Preventive Maintenance

Preventive maintenance is maintenance carried out before an engine failure occurs. This policy is good enough to prevent unplanned machine shutdown. The advantages of preventive maintenance policies are mainly to ensure the reliability of a system, ensure user safety, extend the life of the machine, and reduce downtime in the production process. While the losses that occur include the amount of wasted operating time, the possibility of human error in the assembly process or others.

The goal of preventive maintenance is to maximize availability, and minimize costs through increased reliability. Fithri (2010) conducting research on compressor machines based on the results

of the analysis and discussions that have been carried out, by carrying out preventive maintenance, the level of reliability can be increased according to the target desired by the company, which is up to 90% for the drain valve and oil filter components, in addition the level of reliability of the drain valve component increases by 21.77% and the oil filter increased by 33.34%. By performing preventive maintenance, it can provide lower costs than without using preventive maintenance, which can achieve cost savings of 40.13% for the drain valve component and 24.45% for the oil filter component. According to Smith & Hinchcliffe (2003) There are four categories in Preventive Maintenance. The four categories are as follows:

a) Time-Directed (TD) is maintenance that is directed directly at preventing failure or damage.
b) Condition-Directed (CD) is treatment directed at detecting failures or symptoms of damage.
c) Failure-Finding (FF) is maintenance directed at finding hidden failures.
d) Run-to-Failure (RTF) is maintenance based on the consideration of running a component until it fails because other options are impossible or economically unprofitable.

b. Damage Maintenance

Damage maintenance can be interpreted as a maintenance policy by operating the machine/equipment until it is damaged, then repaired or replaced. This policy is a harsh and unprofitable strategy because it can lead to high costs, lost opportunities to take advantage for the company due to machine stalling, work safety is not guaranteed, machine conditions are unknown, and there is no time, manpower, and good cost planning. Advantages of damage treatment policy:

a) Cheap and requires no maintenance.
b) Suitable for inexpensive and simple, and/or modular machines/equipment.
c) The disadvantage is :
d) Rude and dangerous.
e) Causes heavy losses when set up on machines that are expensive, complex, and
f) require a high level of security.
g) Unable to prepare human resources.
h) Scheduled Maintenance.

This maintenance aims to prevent damage and maintenance is carried out periodically within a certain time span. Maintenance time is determined based on experience, past data or recommendations from the machine manufacturer concerned.

1) Predictive Maintenance

Predictive maintenance is also part of preventive maintenance. This predictive maintenance can be interpreted as a maintenance strategy in which the implementation is based on the condition of the machine itself. Predictive maintenance is also called condition-based maintenance or also called engine condition monitoring, which means determining the condition of the machine by checking the machine regularly, so that the reliability and safety of the machine is guaranteed.

The implementation of predictive treatment can increase the availability of pellet machines one, three and four where the increase ranges from 1% to 3% when compared to the previous treatment system. The reliability value for some pellet machines has increased by 20.55% for pellet 1 and 19.71% for pellet. The total cost of predictive maintenance on each critical component also decreases compared to the cost of previous maintenance. Cost savings for each critical component range from 12% to 90% of the cost of previous preventive maintenance.

2) Corrective Maintenance

According to Nachnul & Imron (2013) Corrective maintenance is maintenance and maintenance activities carried out after the occurrence of damage to the equipment so that the equipment cannot function properly. Corrective maintenance activities include all activities to restore a system from a faulty state to being operational again. New fixes occur when they crash, although some fixes can be pushed back. Corrective Maintenance Activities include Preparation Time in the form of preparation

of labor to carry out this work, travel, tools and test equipment, etc., Active Maintenance Time in the form of routine maintenance work and maintenance activities. Active Maintenance time) in the form of routine activities in maintenance work. The purpose of the activities that have been carried out is repairs, namely waiting for damage to occur first, then repairing them so that existing production facilities and equipment can be reused in the production process so that operations in the production process can run smoothly and return to normal, this statement is reinforced by research previously (Fithri, 2010). According to Andrian (2010: 55–56) In addition to checking for defects on a weekly basis, it is necessary to adopt a policy of reviewing all preventive maintenance programs every half year. Basically this program review includes several things, namely:

a. Review of all records, including inspection cards and equipment history cards.
b. Repair cost review.
c. Review of 'production loss' due to maintenance work.
d. Review for assurance of repair work orders and rearrangement of priority work priorities.
e. Review of what alternatives are preceded or scheduled in advance, 'replacement' or 'dismantling'.

Preventive maintenance is an important component in maintenance activities. Preventive maintenance is a maintenance activity that is carried out before the failure or damage of a system or component, which was previously planned with systematic supervision, detection, and correction, so that the system or component can maintain its functional capabilities. (Kusnadi & Taryana, 2016). Preventive maintenance is a maintenance action that aims to prevent the occurrence of damage whose tendency to damage has been known or can be predicted in advance (Praharsi et al., 2015).

The actual implementation of preventive maintenance varies greatly. Some programs are limited to lubrication and minor adjustments. The preventive maintenance program is more comprehensive and includes a schedule for repairing, lubricating, adjusting and rebuilding all machinery as planned. The top priority for all preventive maintenance programs is scheduling guidelines (Ngadiyono, 2010). Thorough inspection and repair of a facility or part of a facility so that it reaches an acceptable standard (as proposed by Andrian, 2010). In completing the work, at the end of each period one day is added for the inspection of all units simultaneously. This is done to ensure that the order of work in each unit can support each other each task (job element), once started, can continue without separation, so that it will result in: Optimal time for work completion (overhaul) including inspections. The work program can be applied to each unit. The work program for each unit involves all the workers concerned (Andrian, 2010: 34).

Utilization of good preventive maintenance procedures, where there is good coordination between the production and maintenance departments, the following will be obtained (Praharsi et al., 2015): Loss of production time can be minimized, expensive repair costs can be reduced or avoided disruption to the planned schedule, production and maintenance time can be eliminated or reduced.
Factors for Implementing Preventive Maintenance

Some of the goals of preventive maintenance are to detect failures early and minimize product failures caused by system failures. There are four basic factors in deciding the implementation of preventive maintenance (Kusnadi & Taryana, 2016): Prevent failure Detect failure Uncover hidden failure Do nothing because it is more effective than change. By identifying these four factors in carrying out preventive maintenance, there are four categories in determining preventive maintenance. The four categories are as follows (Kusnadi & Taryana, 2016):

a. Time-Directed (TD) is maintenance that is directed directly to prevent failure or damage.
b. Condition-Directed (CD) is treatment directed at detecting failure or symptoms of damage.
c. Failure-Fending (FF) is maintenance directed at finding hidden failures.
d. Run-to-Failure (RTF) is maintenance based on the consideration of running a component until it fails because other options are impossible or economically unprofitable.

The implementation of preventive maintenance is actually very varied. Some programs are limited to lubrication and minor adjustments. The preventive maintenance program is more comprehensive and includes a schedule for repairing, lubricating, adjusting and rebuilding all machines as planned. The top priority for all preventive maintenance programs is scheduling guidelines. All preventive maintenance program management assumes that the machine over a period of time its productivity will decrease according to the clarification. Prevention programs can be divided into three types (Ngadiyono, 2010):

a) Time Driver: Scheduled maintenance programs, where components are replaced based on time or distance traveled. This system is widely used by companies that use machines with components that are not too expensive.
b) Prediktif: Measurements to detect the onset of system degradation (decrease in function), so it is necessary to find the cause of the disturbance that will be eliminated or controlled before all of them have an impact on a significant decrease in component function.
c) Proactive: Engine repair is based on engine feasibility study results. This system is widely applied to industries that use machines with expensive components.

According to Kornel Terplan, that Traffic Management is an effort to coordinate and distribute resources to plan, analyze, evaluate, design, manage, and develop networks in order to obtain good service quality and optimal capacity.

Network traffic management is the job of keeping all network resources in good working order. According to a more modern understanding, in addition to these 3 traffic problems, they also include:

a. Maintenance process
b. Planning process
c. Administration process
d. Network development process

Traffic management functions to allocate traffic to a defined LSP. These include a split function, which divides traffic into specific classes, and a dispatch function, which maps that traffic into LSPs. What must be considered in this process is the distribution of the load across the LSP array. Generally, this is done by setting some sort of weighting for the LSPs and traffic. This can be done implicitly or explicitly. Information and communication technology in English is commonly referred to as Information and Communication Technology (ICT). In general, information and communication technology can be defined as all technologies related to the retrieval, collection, processing, storage, dissemination, and presentation of information. (Asmani, 2011: 99). Another opinion expressed by Zaidatun (according to Isjoni dan Moh. Arif H. Ismail, 2008:143) who stated that information and communication technology is an interactive communication system guided by computers to store and filter text scripts, animations, and information sequences. Ananta Sannai according to Rusman et al. (2011: 88) defines technology and communication as media or tools in obtaining knowledge from one person to another.

According to Aka (2017: 30) Technology and Communication are inseparable counterparts that contain a broad understanding of all activities related to processing, manipulating, managing, and transferring information between media. Wawan Wardiana in Aka (2017: 30) states that information and communication technology can also be interpreted as a tool used to process data, including processing, obtaining, compiling, storing, manipulating data in various ways to produce quality information, namely relevant, accurate and timely information. Based on some of these understandings, technology and communication support can be interpreted as all technologies or tools that assist in efforts to retrieve, collect, process, store, disseminate, and present information to others.

Information and communication technology has several main components that support it. The components that support information and communication technology include computers (computer systems), communication, and skills on how to use them (Asmani, 2011: 107). The meaning of the

word operator in the Big Indonesian Dictionary (KBBI) is "operator" someone who is in charge of maintaining, servicing, and operating equipment, machines, telephones, radios, etc.

Operators are symbols or characters used in programs to perform expressions or manipulate such as adding up, assigning values to variables, comparing values and so on. operator-types-and-how-to-use-operators-in-javascrip/). An operator is someone who has the job of taking care of everything from activation to equipment repair. Operator becomes an important profession in an industry or company. The operator is the person who will carry out and take care of all the needs in carrying out system operations. Adzim (2013) The definition/definition of OSH (Occupational Safety and Health) is generally divided into 3 (three) versions of which are the notion and definition of OHS according to Philosophy, understanding and definition of OSH according to Science and understanding and definition of OHS according to the OHSAS 18001: 2007 standard. While the definition of Occupational Health and Safety OHS Management according to the ISO 45001:2018 standard is a management system or part of a management system that is used to fulfill the OHS Policy or part of an organization & company management system that is used to develop and implement an OHS Policy and manage risks. OHS organizations & companies'.

According to Mangkunegara (2002) Occupational safety and health is a thought and effort to ensure the integrity and perfection of both physical and spiritual workers in particular, and humans in general, the results of work and culture towards a just and prosperous society. Vehicle and Equipment Management is one of the elements related to Vehicles and equipment; vehicle equipment and vehicle maintenance to carry out FUEL distribution and related activities, which is also one of the Ministerial Regulations No. 5 of 1996 Performance pillars in the Land Transportation Safety Management System (SMKTD). Where the Vehicle and Equipment Management Pillar includes the following elements:

1. Vehicle Management

   Systems to ensure that all vehicles match the products stored, handled and transported:
   a. There is a policy to review if there is a vehicle modification
   b. Vehicle complies with statutory regulations and minimum standards
      1) The vehicle is maintained to keep it in good condition and ready to use
      2) according to the manufacturer's recommendations
      3) Determination of technical qualifications.
      4) Determination of the qualifications of personnel who carry out maintenance, maintenance, and repairs as well as modifications in accordance with the required qualifications
2. Safety Equipment
   a. Implementation of safety equipment policy.
   b. Provision of personal protective equipment and protective clothing for all drivers.
   c. The minimum list of personal protective equipment meets the requirements.
   d. There is a schedule of periodic equipment inspections, to ensure the equipment is fit for use and does not expire.
   e. These tools are readily available and easily accessible.

The term "truck" includes conventional rear dump trucks, tractor-trailer trucks and integral bottom dump trucks. In general, the shovel-truck mining method is the most flexible mining method used in geologically complex deposits with varying depths and thicknesses of overburden and smaller deposits. (Westcott dalam Zeng et al., 2017: 7). The flexibility of the system and the ability to haul over long distances make the truck shovel mining method the preferred method of mining in almost any mining situation (Hays, dalam Zeng et al., 2017: 7).

A shovel truck mining system generally consists of a shovel and an associated fleet of trucks. The various grades and waste are loaded onto trucks with shovels and transported from the loading site

to a crusher or landfill. Operating truck productivity depending on the actual truck load and truck cycle time. The truck cycle includes loading and searching, loaded hauling, dumping, empty hauling, waiting and other operational delays (Zeng et al., 2017: 7).

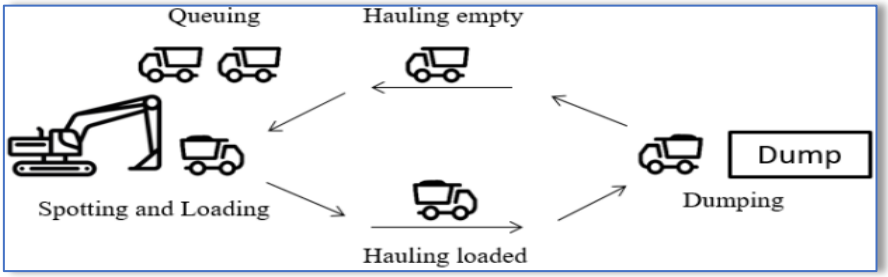

Figure 2. Cycle Rotation Truck

The truck cycle operational constraints are:

1) Spotting dan loading, Spotting is the process by which the truck maneuvers into a loading position. Loading is the process of loading mining products into trucks. The collection of materials into buckets and then unloading of materials onto trucks is called a pass. A number of passes are usually required to load a truck. The viewing time of the truck is affected by the loading method chosen. There are usually four loading methods:

a. Double sided loading technique, Trucks are sighted and loaded alternately on both sides of the shovel. The spade has a maximum swing of 90^0. Sufficient work space on the back and on both sides of the shovel should be ensured.
b. One-sided loading technique The truck is spotted and loaded onto one side of the shovel with a maximum swing of 90^0. The second truck cannot be seen and loaded until the first truck is pulled out of the shovel, therefore compared to double-sided loading, productivity is reduced.
c. Load driving technique, The shovel track is parallel to the face and the truck (tractor-trailer truck) travels to the access road and stops near the shovel. Once loaded, the truck goes through the shovel. The shovel has a maximum swing of 180^0.
d. Modified Ride loading technique, The shovel path is parallel to the work surface and when the truck is driving under the shovel swing path, the shovel is dumped before the truck stops, then the truck is seen to reverse and stop near the work surface. The spade has a maximum swing of 120^0.
e. Travel, Travel includes transporting the loaded material to the dump site and back empty to the loading location. Travel time is subject to the following limitations:
    a) Transport routes, including haul route length, slope, rolling resistance, and road conditions,
    b) Operational constraints such as speed limits and clustering,
    c) Operator performance.

3. Dump, This is the process by which the truck unloads the load at the designated dumping site. There are three disposal methods:
    a. rear exhaust,
    b. Lower debit, and
    c. Side and rear exhaust.

According to Hays (1990), off-road trucks can be classified into three main types: (1) conventional rear dump trucks; (2) tractor-trailer, bottom, side and rear dump trucks; and (3) integral bottom dump truck.

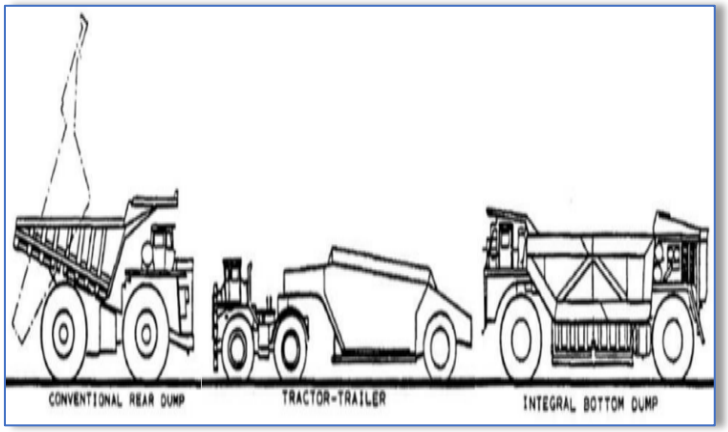

Figure 3. Truck Model

4. Waiting, When a truck reaches a loading or unloading location, it must wait in a queue if the loading or dumping site is occupied by another truck. Generally occurs when the resources (for example, shovels and crushers) in the hauling system do not match the allocated trucks. Some of the factors that can cause waiting times are as follows:
    a. Over-trucking (Over-trucking), When the capacity of trucks in the system exceeds the loading and/or dumping capacity, truck queues form, and truck waiting times increase. This can occur system-wide or at specific loading and/or dumping locations. The number of trucks, for example, may exceed the capacity of all shovels in the system, or the number of trucks allocated to one shovel may exceed the capacity of this one shovel. In the latter case, the waiting time can be reduced by allocating the truck to another unused shovel.
    b. Group (Bunching), The distance between haul trucks is reduced due to the mixing of trucks with varying capacities (Hays, 1990). This happens because overtaking is not allowed on most landmines. During transportation, the phenomenon of faster trucks following slower trucks causes trucks to pile up on the track.
    c. Equipment mismatch, This occurs when a shovel truck system has equipment of various sizes with varying performance characteristics, for example small and large trucks in the same fleet result in different truck cycle times.
    d. Operator performance, Shovel performance varies greatly depending on which operator operates the shovel (Patnayak et al., 2008), with operator experience leading to variations in truck cycle times. It is estimated that by optimizing shovel performance, mines can save as much as 125 minutes per shovel per 20 hours a day (Fiscor, 2007).
    e. Weather conditions, Weather conditions such as rain or snow may result in poor equipment performance and delays in operation.

2) Delays, There are two types of operational delays that reduce the productive yield of equipment (Hays, 1990):
    a. Fixed delays, Planned and usually not considered truck cycle time delays and include reasons such as shift changes, equipment inspections, operator breakdowns, refueling and blasting. Shift changes are an important factor affecting efficiency and productivity in a shovel truck system. Operator performance varies between shifts.
    b. Delays caused when trucks are hauled into the parking lot for shift operator changes (Krause, 2006). The decision to assign trucks either to the shovel or to the parking lot towards the end of a shift can impact shift production (Bastos, 2013). However, hot seat switching (Bruke, 2011), where a truck driver is immediately replaced with another worker

in the mine at the end of a shift, it has become common practice in the mining industry to prevent production stoppages.

c. Variable delays Unpredictable delays and must be considered in truck cycle times, including haul road maintenance, loading area cleaning, driver assistance stops and equipment breakdowns.

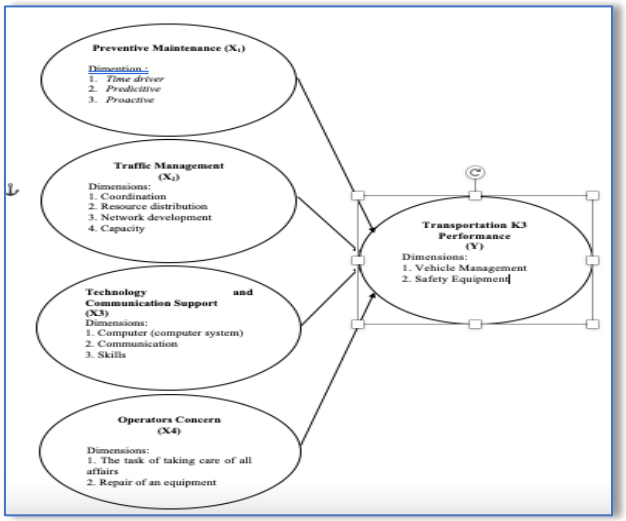

Figure 4 . Framework Research

3. METHODS

The research method used is a quantitative method. Of the two types of quantitative methods (experimental method and survey method), this research uses a survey method. The data analysis technique used in this study is a qualitative data analysis technique with the aim of providing a systematic, accrual and accurate description of the phenomenon under study.

4. FINDINGS AND DISCUSSION

Respondents by gender are presented in the following table:

Table 3. Employee Composition by Gender

Gender		Total
Man	Woman	
125 Years	20 Years	145 Yeasr
Total		**145**

Total : Company

Based on these results, it is known that there are 125 male employees and 20 female employees. It can be explained that in general the employees of PT XYZ Mining Services Company are dominated by men. Gender can affect employee perceptions. Effect of Preventive Maintenance on Transportation OHS Performance.

It is known that the results of the study indicate that Preventive Maintenance has a partial effect on the performance of K3 Transportation, this is evidenced by the t-test value of the Preventive Maintenance variable of 4.618 with a significance level of 0.000. While the ttable value for N = 145 is 1.976. So tcount > ttable (4,618 > 1,976) with a significance of 0.000 < 0.050 then H0 is rejected and Ha is accepted, it can be stated that Preventive Maintenance (X1) has a positive and significant effect on Transportation K3 Performance (Y).

In this study, Preventive Maintenance has a significant effect on the performance of K3 Transportation, this study is in accordance with previous researchers Dewi & Purnawati (2021) This research results in a maintenance role that can strengthen the influence of TQM on company performance.

This research is supported by the theory put forward by Doloi et al. (2011) that the success of a project is strongly influenced by the expertise and performance of the contractor. Factors other than human resources that have a significant influence are materials and equipment. The selection and utilization of equipment must be in accordance with the needs in terms of type, quantity, capacity, and available time. Likewise, how to use it must follow operating and maintenance procedures that are in accordance with the function of each equipment. Construction management components consisting of contractors, consultants, PPK, materials, and equipment have a significant influence on the achievement of flexible pavement preventive maintenance quality. Therefore, a comprehensive management of construction management components is required.

The Effect of Traffic Management on OHS Performance in Transportation

It is known that the results of the study indicate that Traffic Management has a partial effect on the performance of K3 Transportation, this is evidenced by the t-test value of the Traffic Management variable of 2.496 with a significance level of 0.014. While the ttable value for N = 145 is 1.976. So tcount > ttable (2,496 > 1,976) with a significance of 0.014 < 0.050 then H0 is rejected and Ha is accepted, it can be stated that Traffic Management (X2) has a positive and significant effect on Transportation OHS Performance (Y). In this study, Traffic Management has a significant effect on Transportation K3 Performance, this study is in accordance with previous researchers Bau et al. (2020) This research resulted in a New Traffic Management in the Losari area which succeeded in improving traffic conditions in the area. The observed road sections have a service level of A, which means that the New Traffic Management implemented has succeeded in reducing the potential for congestion in the area.

This research is supported by the theory put forward by Widowati (2017) The results of monitoring and review must be properly recorded, documented and reported to both internal and external stakeholders and used as input for further planning. In line with this, systematic monitoring and evaluation can improve the quality of data related to traffic accidents so that it can be used as a reference to improve safety programs in the future. (Varhelyi, 2016). Monitoring and evaluation of traffic safety implementation is carried out through internal audits and periodic reviews of the traffic safety system to make continuous improvements.

Effect of Technology and Communication Support on Transportation K3 Performance

It is known that the results of the study indicate that Technology and Communication Support has a partial effect on OHS Transportation Performance, this is evidenced by the t-test value of the Technology and Communication Support variable of 4.665 with a significance level of 0.000. While the ttable value for N = 145 is 1.976. So tcount > ttable (4,665 > 1,976) with a significance of 0.000 < 0.050 then H0 is rejected and Ha is accepted, it can be stated that technology and communication support (X3) has a positive and significant effect on Transportation K3 Performance (Y).

In this study, Technology and Communication Support has a significant effect on Transportation K3 Performance, this study is in accordance with previous researchers Jati (2014) This study The results of this study indicate that each region faces problems with distinctive characteristics, therefore the way the program is implemented Road transportation safety varies according to the complexity of the problem. Meanwhile, according to Cadas (2021) technology and communication support has a positive influence on employee performance.

This research is supported by the theory put forward by Mangkunegara (2002) Occupational safety and health is a thought and effort to ensure the integrity and perfection of physical and spiritual work in particular, and humans in general, work results and culture towards a just and prosperous society.

According to Hariandja (2007) K3 is an important aspect in efforts to improve employee welfare and productivity. Technology is one of the best innovations developed by humans, with technology that greatly facilitates human life in carrying out its activities. Communication is one of the reciprocal activities carried out by individuals or other people, as well as groups with the help of the media or carried out directly face to face.

The Effect of Operator Care on Transportation OHS Performance

It is known that the results of the study indicate that Operator Care has a partial influence on the performance of K3 Transportation, this is evidenced by the t-test value of the Operator Care variable of 3.015 with a significance level of 0.003. While the ttable value for N = 145 is 1.976. So tcount > ttable (3,015 > 1,976) with a significance of 0.03 < 0.050 then H0 is rejected and Ha is accepted, it can be stated that Operator Care (X4) has a positive and significant effect on OHS Transportation Performance (Y).

In this study the operator's concern has a significant effect on the performance of K3 Transportation, this study is in accordance with previous researchers Benny Agus Setiono, (2018) The results of the analysis show that there is a caring attitude from the management of PT Pelindo III East Java Province towards employee safety and the availability of adequate safety equipment. This research is supported by the theory proposed by BPSDM (2012). One of the individual tasks that have an impact on the interests of the group is the implementation of K3-L so that each group member has been equipped with an attitude of concern for the implementation of K3-L in the workplace.

5. CONCLUSION

The author draws conclusions from the results of research or writing this research. The conclusions from the results of this study are as follows:

There is an effect of preventive maintenance on the performance of K3 transportation, with the tcount value of the Preventive Maintenance variable of 4.618 with a significance level of 0.000. So tcount > ttable (4,618 > 1,976) with a significance of 0.000 < 0.050.

There is an effect of traffic management on the performance of K3 transportation, with the tcount value of the Traffic Management variable of 4.665 with a significance level of 0.000. So tcount > ttable (4,665 > 1,976) with a significance of 0.000 < 0.050.

There is an influence of technology and communication support on the performance of K3 transportation, with the tcount value of the Technology and Communication Support variable of 4.665 with a significance level of 0.000. While the ttable value for N = 145 is 1.976. So tcount > ttable (4,665 > 1,976) with a significance of 0.000 < 0.050.

There is an effect of operator concern on OSH transportation performance, with operator concern variable tcount of 3.015 with a significance level of 0.003. While the ttable value for N = 145 is 1.976. So tcount > ttable (3,015 > 1,976) with a significance of 0.03 < 0.050.

Based on the results of the study indicate that the Improvement of Unit Truck Maintenance at the Mining Service Company PT. XYZ Against Mining Accident Reduction has been able to do well. This implies that Improved Maintenance of the Truck Unit has a very important role in achieving the goal of Reducing Mining Accidents. Through the right strategy, it is expected to improve the performance of K3 transportation in accordance with the goal of Reducing Mining Accidents.

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