

The Application of Occupational Safety and Health Management in Train Workshop "Balai Yasa" PT Kereta Api (Persero) Yogyakarta

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Abstract

Balai Yasa Yogyakarta is the center of locomotive maintenance of diesel locomotive that operating in Java Island, Indonesia. It is very important for maintaining the quantity and quality or reliability of operated diesel train. This must be supported by strong and professional industrial management. Therefore, it has been preparing to be an outstanding "maintenance industry" in the country based on the integrated industrial management principle. Yet, so many lacks of human resources it has that to apply the dreaming concept is still a big problem, mainly of standard Occupational Safety and Health (OSH) management. This paper aims to research the aspects concerning about human resources in applying Occupational Safety and Health (OSH) management thoroughly. The study focuses on problem happening in human, tools, materials, and management aspect. It uses observation and document research approach and presents descriptive data collecting. While, qualitative approach is used for analyzing based on standards of Occupational Safety and Health (OSH) Management System published by Manpower Ministry of Indonesia. The output and discussion of the research becomes descriptive fact of Occupational Safety and Health (OSH) application in Balai Yasa Yogyakarta. The conclusion is recommendation in nature that should be practically carried out by the manager in the industry.

Keywords

Train, occupational safety and health, work system, management.

1. Balai Yasa and Locomotive Maintenance

Railways is one of the studies in the field of land transport in which has variuos aspects such as the operational economic value, transport modes reliability, transport safety, and maintenance systems of such transportation modes. The railway system reliability is mostly determined by the factory that 'conducts' the maintenance work (in Indonesia is called Balai Yasa) [1]. There is a correlative impact between the locomotive system reliability and the results of the work done by its maintenance factory. The task to maintain the locomotives in Indonesia is carried out in Balai Yasa, Yogyakarta. The reliability system of this locomotive workshop needs to be increased, and the locomotive itself does too. There is a general assumption that the number of train accidents cases in Indonesia recently within 2005 until 2009, one of them is because the lack of locomotives and Balai Yasa reliability. It is based on the strategic value of Balai Yasa, that in May and July 2007 it was respectively visited by two officials of the Republic of Indonesia, the Vice-President and Minister of Transportation [2]. However, these general assumptions need to be scientifically proven and specifically examined concerning with existing work systems in Balai Yasa Yogyakarta, in order to find out the truth.

2. Strategic Function of Balai Yasa Yogyakarta

Balai Yasa PT Kereta Api (Persero/Incorporated) Yogyakarta (hereinafter referred to as Balai Yasa Yogyakarta) is a plant (the main, and is the only one workshop in Java Island) in which all types of diesel engines (both diesel electric, diesel hydraulic, or diesel train) operating on Java Island Region maintained [3]. In this industry, issues that intersect with the ergonomics are so great as human labor is widely used to maintain diesel locomotive using various types of equipment and supplies. Ergonomics problem arising here is very complex, ranging from questions about the employees factors, to the issues in a broader scope; i.e. the production process in the working environment. The existence of this industry largely determine the reliability quality of diesel locomotives operating on the tract. Balai

Yasa strategic value indirectly guarantees the safety, health, security, and comfort to all people who use railway transport services. It means that the process of working in this industry largely determines the quality of service for the people who use it. Therefore, as a single operator of railway industry in Indonesia, PT Kereta Api (Persero) has the main role to design the 'face' of Indonesian railways service.

3. Accidents Due to Work in Balai Yasa Yogyakarta

The two types of accident sources mostly to cause damage or loss of live in work place happen in Balai Yasa Yogyakarta are unsafe action and unsafe condition. In addition, unsafe workers action and working equipment along with environmental conditions can be combinative causes of accidents. Both sources refer to the theory of two main factors causing accidents. However, people (workers) is the main factor of accidents. In accordance with the data given by the International Labor Office, the accidents happen in industries around the world approximately 85% due to the labor factor, while 15% are caused by environmental factors and work equipment [4]. The number of accidents that occur due to work at Balai Yasa Yogyakarta shows that the industry hasn't run standard Occupational Safety and Health (OSH) programs. In a period of 8 years in a row, 44 accidents occurred due to work at Balai Yasa Yogyakarta, with a various types of accident [5]. There are nine of them: hit, pinch, scratch, hit, fall, affected the flow of electricity, exposed to a hot body, eyes take in a foreign object, and the fall of objects. The study, prsents frequency rate of accident for example in 1.5 year period, in which 4.9 accidents causing injuries occur for every one million hours worked. Research conducted found the fact that officially reported in 2006, in Balai Yasa Yogyakarta, there were 3 accidents occurred due to work, one time in February and two times in May [6]. They should not happen, as in 2005, Balai Yasa Yogyakarta has been awarded a "zero accident" label from the Minister of Manpower of Indonesia. Zero accident is a condition in the workplace which shows good risk control system in an industrial accident.

4. Problems in Balai Yasa Work Area Yogyakarta

The cause of the accident due to work in Balai Yasa Yogyakarta is ascertained that worker factors (unsafe action) is the dominant cause and unsafe condition or equipment and work environment presents significant factor as well. Both factors are capable to share the cause of accidents due to work. Based on the result of direct observation documented by an electronic recording device (in this study) and from previous research results, that visual description shows the state of the system and unergonomic working environment, risky to workers. The following describes various problems and its impact found in Balai Yasa Yogyakarta.

Table 1: Workplace problems and its layout

No.	Problem Description	Impact to The Workers
1	Unoptimum departmental layout based on the measurement and technical analysis [7].	(a) energy wasting of workers in the material handling, (b) back tracking to cause delay and crash risk on workers, (c) idle time by the complexity of traffic during material handling in the alley.
2	The layout of the machines that some are not yet qualified as a form of ergonomical work stations [8].	(a) energy wasting of workers in the material handling, (b) back tracking to cause delay and crash risk on workers, (c) limited movement of workers at work stations and injury risky.
3	Each work departments area is not entirely separated by insulation and spacing.	(a) put down and stack components are disorderly and haphazardly, (b) decline sense of responsibility for workers' work unit.
4	The placement and stacking of components (such as wheels and traction motors) that interfere with traffic in the aisle and work stations.	(a) the movement of workers, both in the hall and work stations is limited and injury risks, (b) idle time by the complexity of traffic as material handling, (c) delays by the limited movement.
5	No separation or isolation of high-risk departments for the OSH, such as LMATE department and LMATH which is very noisy in isolated places.	(a) the risk of illness due to work on ear organs, (b) the risk of workplace accidents due to noise interference, (c) concentration of work is interrupted, both in the department and surrounding departments.

Table 2: Problematic environmental conditions

No.	Problem Description	Impact to The Workers
1	The intensity of light at some work stations are not eligible.	(a) the risk of illness due to work on the eye organ, (b) the risk of workplace accidents.
2	Working environment degree temperatures exceeds the optimum temperature.	(a) cause discomfort to work, (b) cause work fatigue.
3	Floors made of asphalt and wood, some have been coated by dirt and oil, so quite slippery.	(a) very risky to get accidents, like slipped and fell, (b) disturbed movement of workers and work processes, both in the hall and work station.
4	Solid waste (metal) and liquid (oil) are scattered on the floor of workplace.	(a) the risk of worker crushed when walking, so it can slip and or hurt, (b) displacement or obstructed labor movement.
5	Dirty air, characterized by a suffocating smell of breath, such as dust, oil, metals, materials and other chemicals.	(a) the risk of illness due to the work of the lung organs, (b) work concentration is interrupted, (c) the vulnerability of stolen break by workers, (d) disgust working in the area.
6	Smoke, steam, and sparks are dangerous for the eyes and respiratory, which arise from the process engine, work benches, and welding.	(a) the risk of accidents and illness due to work of various working processes in various departments, (b) inhibits productivity, (c) causes inconvenience to work.
7	The roof and walls are dirty with smoke and dust causing the dark atmosphere and 'pressing' psychologically.	(a) the risk of accidents and illness due to the work of various working processes in various departments, (b) inhibits productivity, (c) causes inconvenience to work.

Table 3: Human engineering design problems

No.	Problem Description	Impact to The Workers
1	The size of imported machines, such as lathes and frais are not fit for service in Balai Yasa Yogyakarta, and must be modified.	(a) the risk of accidents and illness due to the work of various working processes in various departments, (b) inhibits productivity, effectiveness and efficiency for the low employment, (c) causes inconvenience to work.
2	Using malfunction equipment because the operator is out of habit.	(a) the risk of accidents and illness due to work, (b) creates a culture of reckless.

Table 4: Problem transfer materials, transportation, and storage

No.	Problem Description	Impact to The Workers
1	The transfer material is not efficient according to calculations [9].	(a) waste of energy in the material handling workers, (b) tracking back to cause delay and idle time.
2	Forklift truck that passes through the narrow alleys where many operators work.	(a) the risk of workplace accidents, the crash or pinned, (b) delay caused by the limited movement.
3	Forklift truck carrying components and often exceed the capacity of workers loaded.	(a) the risk of workplace accidents, the crashed or fell, (b) delay caused by the limited movement.
4	Bridge crain move heavy components on the main track and the area which is full of the departments of continuous activity.	(a) the risk of workplace accidents, the crashed or fell of heavy objects, (b) delay caused by the limited movement, (c) create a feeling of worry being crashed or fell by the objects.
5	Overload lorry transport capacity to.	(a) the movement of workers who movevery heavy lorry, (b) the risk of injury.
6	Components used and unused stored mixed into one.	(a) if required, can either mischoose or confused taking, (b) requires time and effort to find components.
7	Operator places the components with swinging thrown.	(a) the risk of workplace accidents, the fall of objects or pinned, (b) create a culture of reckless.

Table 5: Problem employment planning information

No.	Problem Description	Impact to The Workers
1	Locomotive maintenance procedures less follow the book Maintenance Instruction [10].	a) create a culture of inconsistent and allow the violation, (b) inhibit the productivity of work, because the measures based on non-standard work.
2	Idle time is too long in the work process, such as in the locomotive rehabilitation improvement.	(a) work in a hurry to immediately switch to work incidental program emerging risk injury, (b) job stress due to over load work.
3	Components waiting on the track and work to be done, with a limited operator service capacity.	(a) work in a hurry to immediately switch to work incidental program emerging risk injury, (b) job stress due to over load work, (c) the movement of workers, both in the hall and work stations is limited, (d) work fatigue.

Table 6: Inspection problems and promotional programs

No.	Problem Description	Impact to The Workers
1	Use of various types of personal protection devices (either to protect eye, nose, mouth, ears, head, arms, hands, or feet) are still ignored by the workers.	(a) the risk of accidents and illness due to working various processes in various departments, (b) cultivate an attitude that continue violations undermined by workers, (c) create a culture of reckless.
2	working clothes that are too dirty and not uniform.	(a) cause discomfort to work, (b) shows untidiness and slums.
3	Minimum monitoring of risk hazards in the workplace and not affordable for the quality control system.	(a) cultivate an attitude that continue violations undermined by workers, (b) may make sense to worry affected by work accidents and illness.
4	OSH posters is dirty, unattractive appearance, the installation in places that are less precise, and limited in number.	(a) does not provide good and right awareness about K3, (b) when read, can lead to misinterpretation and confusion, (c) assume the posters are not useful.
5	K3 has different meaning into written "Cleanliness, Order, Beauty". This is not in accordance with K3 campaign. K3 should be stated as Keselamatan dan Kesehatan Kerja (OSH).	(a) does not provide good and right awareness about K3, (b) considers trivial attitude and already understand the benefits and contents of these slogans.
6	Fire extinguishing equipment. (type of tube and a fire hydrant) at 32 places are not placed in a clear and appropriate strategic goals.	(a) if the equipment is needed, can lead to misinterpretation and confusion, (b) considers the small/insignificant benefit from the equipment, (c) are not trained readiness to use.

Tables 1 to 6 illustrate that the problems are viewed from various aspects and occur in the workplace. Connected with the result for the workers, they show a definite link. Then, they can derive various possibilities, either as single or combinative possibility. Work accidents can be caused by a variety of possibilities that exist in the workplace, in accordance with high potential in the triggering factors.

5. Work Illnesses in Balai Yasa Yogyakarta

Illness due to work occurred in Balai Yasa Yogyakarta (based on observations research at the workshop), can be caused by physics, chemistry, biology, and ergonomics factors. The most common work related diseases in this place are hearing loss due to noise (physical factors) and Upper Respiratory Infection (chemical factors) due to gases and steam [11]. Research found the fact that the measurements performed on 16 workers at the work unit test and final test room (LMATE and LMATH departments) at Balai Yasa Yogyakarta, obtained that (1) as many as 10 workers hearing impaired or lighth deaf on the right ear, (2) 5 workers with hearing loss or light deafness on the left ear, (3) there are significant results, that mild deafness is caused by exposure to high noise in these work units, although they have used earplug (some only use cotton) [12]. Research mentions that the noise level in the LMATE and LMATH departments of Balai Yasa Yogyakarta is 113 dB, which on a scale of intensity noise [13], has been included in the criteria for deaf or hearing damage [14]. Even worse, final test job done on the locomotive in a long time and repeated periodically. Deafening noise effect is felt also by the workers around the department in about 60

meters.

Gas and steam cause chemical health problems. Work related diseases data in the Medical Center in Balai Yasa Yogyakarta [15], shows that the cause of respiratory infection is chemical substances used in the work process. They are lead, tin, zinc, gasoline, acetylene, various types of lubricating oil, and the like. Until now, the use of chemicals are still in progress, and work conditions have not been changed. Equipment such as protective masks, cartridge, and a respirator, do not seem applicable in the workplace. This constant exposure in the workplace has become the obvious cause of respiratory infection to the workers who use hazardous materials. Besides, exposure of these chemical factors should be immediately overcome in order to implement the actual health. As for biological factor, so far it has not been found as the cause of illness due to work arising in the workplace. From the point of ergonomic factors, the cause of illness due to workplace is the engine layout and poor working environment. Direct effect of this influence is occupational stress that result in fatigue, decreased alertness, and doing the wrong movements. This, in addition to causing job stress, also can cause fatigue of work, and the worst is work accidents. The most dangerous work environment and job stress have indications (1) the workplace is wet and dirty, (2) the risk of accidents, (3) the workplace is hot or cold, (4) changes in temperature during working hours, (5) bad lighting [16]. Work environment conditions in Balai Yasa Yogyakarta allow occupational stress on the workers, even although at least in mild stress. The implications of the work stress and fatigue of work is declining labor productivity.

6. Health Programs Expected

Health care programs should be designed to protect workers from work illness. Occupational Safety and Health education and training aimed at encouraging workers to accept and continue good work habits, healthy, safe, and convenient, using appropriate working equipment, and make an agreement among the workers themselves (individually and collectively) to protect their health and improve the working conditions [17]. Principles and practice of occupational health, as well as the properties of the health hazards that can occur in the workplace, should be taught to the workers. Health education for workers can be provided through programs of skills training before starting work, or when the work has been being done. Establishing working environment free from risk of work illness in Balai Yasa Yogyakarta will create a healthy interaction and the positive or balance between humans and machines or equipment in the factory environment.

7. Safety and Health Management

At the time when the research has been being conducted, Balai Yasa Yogyakarta has not established a work unit or appointed a group to specifically handle OSH. In the organizational structure Balai Yasa Yogyakarta, there was no one working on OSH unit, so it is known that OSH management has not been carried out independently with the active involvement of every worker in the factory [18]. Currently, the organization which becomes the OSH program manager in Balai Yasa Yogyakarta is an Industrial Hygiene and Work Safety Subsection, which is under the work unit of PT Kereta Api (Persero) Operational Territory (DAOP) VI Yogyakarta. This OSH work unit run the program for all operational activities including train the entire work system operating in DAOP VI, so the scope of its activity is not exclusively in Balai Yasa Yogyakarta alone. In running OSH program, Balai Yasa Yogyakarta follows the Directors Decision of PT Kereta Api (Persero) Number: Kep.U.KP.501/XI/7/KA-2000, About Safety and Health Guidelines for the Environmental Working in PT Kereta Api (Persero). If reviewed, the 8 article board's decision has actually been adequate to meet the desires of OSH in the railway industry. However, as written in Article 7 of that decision, the issue of OSH in the unit of work on PT Kereta Api (Persero) is the responsibility of the Head of Industrial Hygiene and Work Safety Subsection at every DAOP [19]. Hence the extent of the problems dealt with in this work (including the various stations, depot maintenance, operations offices, Balai Yasa, and the largest in the path of operation), the OSH is not well covered. K3 limited number of experts and capabilities in this industry are also an obstacle in the implementation of OSH standard.

8. Recommendation

Efforts to prevent accidents on the railway system has been outlined by the manager of PT Kereta Api (Persero). One of four things improved for the prevention of accidents in the short term on the railway system is to improve the quality of human resources or personnel [20]. "Supervision of discipline in the use of the applicable regulations", is an important thing done in the industry. This is realized the importance of the railway labor system reliability, but it seems that the manager is still hard to quickly implement it. Blocking factors are too complex, that need to be solved optimally.

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