

## The Assessment of Fire Prevention Effort in Asylum Radjiman Wediodiningrat Lawang

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**Abstract:-** Fire incident that happened in Radjiman Wediodiningrat Mental Hospital was gave both material and non-material impact. The purpose of this research was to conduct assessment in the fire-fighting effort in Radjiman Wediodiningrat Mental Hospital. The approach that used was a qualitative approach through in-depth interviews and observation.

The results showed that safety management system in hospitals follow government regulations which must be formed executive committee of safety and health at the hospital. Hospitals had established policies on occupational safety and health. Some policies are documented in a decision letter. Planning of safety program has been compiled based on Hazard Identification, Risk Assesment, And Determining Control HIRADC and there are some facilities that do not have licenses. Facilities and fire fighting equipment has been provided, it's just still not complete. Evaluation and follow-up reduction programs are also not optimally implemented. One of the results of the management review is the use of fire extinguisher training for all hospital staff and the provision of fire-fighting facilities. Conclusion: The system of fire prevention efforts implemented under the clause of Occupational Health & Safety Assessment Series (OHSAS) 18001 with Plan-Do-Check-Action PDCA approach has not been fulfilled, namely the clause hazard identification, investigation, fire management procedures, communication, evaluation tools, and training. Follow-up and recommendations for Radjiman Wediodingrat mental hospital is active and passive protection systems complementary for fire training and evaluation of fires fighting efforts.

**Keyword:-** fire fighting, safety management system, mental hospital/asylum

### I. INTRODUCTION

Fire is often occurred and the impact of it is greater in material and non-material. According to Furness & Muckett (2007), the causes of fire in general are electricity, cigarette, friction, bulb, the damage of *Liquified Petroleum Gas* (LPG), and others. *National Health Service* (2009) stated that in 2008-2009, a fire was occurred in some hospitals that caused *short and long term consequences* such as loss of life, finances, particularly loss of safety.

Actually, a fire is not a disaster because almost 99% , the fire in Indonesia was caused by human factor either intentionally or unintentionally (Saharjo et al, 2013). A fire in Indonesia becomes an environment issue in the world because it causes the negative impact. The multidimensional impact of fire includes social impact, economic impact, environmental impact, and political impact. Besides, according to Tacconi (2003) who conducted an economic study about the fire impact in 1997/1998, a fire caused degradation and deforestation economically in 1,62-2,67 billion dollars, the cost as the smog impact in 674-799 million dollars, and carbon emission in 2,8 billion dollars.

According to the background of the study in RSJ Radjiman Wediodiningrat, RSJ Radjiman Wediodiningrat is an asylum where as the place of treating some patients who have mental disorder and it is being developed as the public service. As the asylum of public service, the patients are not only in special needs but also in labor. The patient is a patient who has mental disorder and the cognitive one. Therefore, it can make the patient feels difficulty to know what they should do when there is a fire. According to Purwanto (1998), there were several mental and behavioral disorders such as schizophrenia that one of the symptoms was they would not do the normal human's behavior and apathy. Hence, for the asylum, the approach for fire emergency response will have some differences due to the mental disorder patients.

The assessment of fire prevention effort is one of the efforts to uncover the cause of a fire. The institution will always follow the cycle of plan-do-check-action by risk management approach. The assessment of fire prevention effort is also an effort to do an evaluation (check) to the system of fire risk management in RSJ Radjiman Wediodiningrat.

A fire is one of the incidents that can cause negative impact in material and non-material. According to the report of accident in RSJ Radjiman Wediodiningrat, a fire in 2012 was occurred in financial administration room. The material detriment was not great and there were not any victims. However, the cause of the fire had not ever been analyzed before. Hence, it is very important for everybody in the hospital, particularly asylum, to know how the effort of fire prevention is in order to be found the solution for fire prevention and fire emergency response.

RSJ Radjiman Wediodiningrat has not done some plans to prevent fire and one of them is doing the system of active protection toward the fire and planning to do some training in every year. However, the implementation of it (Do) has not been maximum because the firefighter team still has the obstacle in extinguishing the fire. Moreover, the evaluation aspect (check) has not been done well because the risk theory that is according to Hazard Identification, Risk Assessment, And Determining Control (HIRADC), control, documentation, until investigation have not done specifically. Besides, there is still less of review management that is caused by there isn't any basis of determination of long-term and short-term programs based on HIRADC. Hence, the writers were interested to discuss this topic as their study.

## **II. METHOD OF THE STUDY**

This study is a qualitative study. The data was found by observation and the writers did not do any particular activities to the object of the study during the study. Furthermore, this study and this qualitative approach were the study that the informant as the active one who interacted according to his or her experience and to be aware of the different phenomena (Denzin & Lincoln, 2009).

The data was taken directly in the location of the study in April until May 2014. During a month, the writers interacted directly to the subject of the study by interviewing and observing.

The technique to determine the informant was the writers determined the informant who had know most about the fire in RSJ (*Rumah Sakit Jiwa* (Asylum) Dr. Radjiman Wediodiningrat Lawang. The sample of the study was taken by snowball approach that meant the informant would be determined based on the first informant's information. The data was stopped when the data was obtained relatively saturated. The criterion of the informant was he or she knew either directly or indirectly in detail the issue of this study and he or she focused in the issue of this study.

### **This study focused in:**

#### **1. General Requirement**

The institution developed and kept the management system of occupational health and safety, hence, it required the minimum requirement of OHSAS 18001. This study focused to discuss in detail about the clause of management system of occupational health and safety and initial review by interviewing and observing.

- a. The management system of occupational health and safety is the system that is held in asylum to guarantee the implementation of occupational health and safety and the clause of OHSAS 18001.
- b. Initial review is an organization activity to compare the condition or actual risk and the regulation.

#### **2. Commitment and policy of occupational health and safety**

Commitment and policy of occupational health and safety were about occupational health and safety policy and the management commitment to ongoing improvement and to be communicated to all of the employees in order to make the employees aware of their responsibility individually in occupational health and safety. The commitment and the policy of occupational health and safety were a written statement of the basis in controlling the implementation of occupational health and safety. This study focused to discuss in detail about the clause commitment of management system of occupational health and safety and the policy by interviewing and observing the data.

#### **3. Planning**

4. The organization planning was about the procedure in identifying the danger, risk assessment, the technique of controlling, and the consideration of the result in identifying the danger and risk assessment in determining the purpose of occupational health and safety. This study focused in hazard identification, risk assessment and determining control (HIRADC) and fulfilled the legal aspect by interviewing and observing the data. Below are the focuses of the study about Planning in fire prevention effort :

- 1) Hazard Identification, Risk Assessment, and Determining Control (HIRADC)  
The method and the result of risk identification are done by RSJ Radjiman Wediodiningrat.
- 2) The Requirement of Legal Aspect  
The requirement of legal aspect is about the fulfillment of licensing of the equipment and supplies that are owned and required legally.

## 5. Implementation and Operation

The implementation and operation are about the implementation of planning in fire prevention effort. This study focused on the resource, competence, communication, documentation, operational control, preparation, and response of the emergency condition by interviewing and observing the data. Below are the focuses of the study about the implementation and operation in fire prevention effort:

- 1) Resource  
The resource of occupational health and safety is owned, including human resources, infrastructure resources, and technology resources.
- 2) Competence  
The competence that is owned by the personnel who is from occupational health and safety training based on training needs.
- 3) Communication  
Either internal or external communication is utilized in fire prevention effort.
- 4) Documentation  
All of the documenting efforts that is done by RSJ Radjiman Wediodiningrat is about the program of fire prevention effort.
- 5) Operational control  
The controlling effort that is done during the implementation of fire prevention effort.
- 6) The preparation and the response of emergency condition.  
The effort in RSJ Radjiman Wediodiningrat is utilized to confront the emergency condition.
- 7) Checking and corrective action  
The checking and corrective actions are about the decision and the procedure of maintenance to control the performance of fire prevention effort periodically. The study focused to measure and to control by interviewing and observing the data.
- 8) Management review  
The management review is about the management that examines periodically the fire prevention effort to assure the congruence, the sufficiency, and the affectivity. This study focused in management review by interviewing and observing the data.

However, this study will prioritize in Checking and Corrective Action and Management Review because both of them are the basis to compose the recommendation of fire prevention. The analysis of data of this study is primary and secondary data such as the result of in-depth interview and observation, all of the supporting documents and the fire documentation in RSJ Radjiman Wediodiningrat.

### 1. Indepth Interview

In this step, the writers will collect the data and information by doing observation and in-depth interview to the informant of this study. The informants (as the object of this study) are the people who have obtained the explanation of the purpose of this study and have a willing to give their signature to the informed consent. Besides, the informants of this study are the people who have a willing to participate in this study by giving their signature to the informed consent. The information is obtained by doing in-depth interview to the informants. In-depth interview is done in about 30 minutes by using the instrument of interview guide.

### 2. Observation

During the observation, the writers will be help by the observation sheet. The result of the observation is utilized as the data triangulation. The data of the observation will be modulated with the result of in-depth interview that will be compared with the secondary data. Furthermore, the observation will be done after doing in-depth interview.

### 3. Secondary Data Collection

The writer will collect the secondary data that is obtained from the management party such as the document of the prevention of occupational accidents, the document of the institutional policy, the accident reports, the documentation of management in the occurrence of accident, and PMK notes.

## III. RESULTS AND DISCUSSION

### I. Results of Investigation

Based on the data investigation report fires fire psychiatric hospital Dr. Radjiman Wediodiningrat in 2012 it is known that a fire event is on Friday, dated April 6, 2012 at 16.30. Fires occurred in the eastern part of the financial secretariat building RSJ Dr. Radjiman Wediodiningrat. Genesis was initially suspected because of the flow of an electric short circuit triggered lightning strikes.

The lightning strike triggered spark that caused the fire in the office of finance. Based on information from informants, a fire arising in the cupboard which contained a television. Television burned out and the fire is suspected as a buddy. The informant also stated that there is not a good electrical installation because there

are few electrical panels are used beyond capacity. Suppression efforts carried out by members of the security forces (guards), led by a team leader S. III.

### **1. Human Factors (Man)**

**a.** Workers have not had experience blackouts

Information from informants are some workers helping to quell the efforts outages as quickly as possible. The team has trained fighters, but in an emergency worker or team has no experience blackouts, especially in terms of communication with the relevant parties.

**b.** Workers do not have a certified fire

Worker or team who make the effort outages have been trained to carry out fire fighting. Certification Experts firefighters required as part of the fire-fighting effort. information obtained during the interviews and observations, and document review are not fire experts certification.

**c.** The results of the assessment and evaluation of training in team fighting not running optimally

Based on observations and interviews obtained information that the team has not been able to optimally fire fighting operations. Training has been given in recent years, but the final evaluation of the competence and expertise of a team of firefighters face darurat conditions can not be evaluated properly. Penialain results are given only on the level of participation that has not led to the expertise of participants to confront the actual fire conditions

### **2. Factor Method (Method)**

Operation there standard procedures (SOP) for the reduction of the fire has been owned by RSJ Radjiman Wediodiningrat. SOPs include fire prevention is SOP (Document No. 06.04.07.01), occupational health and safety SOP (Document No. 06.02.03.01), and SOP internal disaster management (Document No. 06.05.06.04). SOPs available corroborated by the letter of the director's decision-making such as the director of safety programs, fire and disaster preparedness (K3RS).

### **3. Factors Engineering or Equipment (Machine)**

Electrical equipment as well as a lightning rod has been installed in the administration building where the fire occurred. Computer and electronic device using unsafe electrical panels, where there is an electrical panel for multiple electronic devices. The informant stated that there is a fire at the location that exceeded the capacity of the electrical panel. During observation and document review related documents have not found another letter from PLN operation.

### **4. Factor Materials (Materials)**

Lightning rod has been installed in the administration building, but it is not known whether the material used meets the standards PUIL 2000 addition to the scene of the fire there were some combustible material that has not been arranged so that the material is kept away from sources of ignition. The informant stated that the fire broke out above the cupboard where the television is on fire is suspected to be the source of the fire.

### **5. Environmental Factors (Environment)**

The weather became a factor that allegedly spurred the fire. The weather at the location when the fire in the rain accompanied by lightning. Control efforts to ward off lightning strikes have been carried out. Administration building is a three-story building and the highest around and very risky for a lightning strike.

## **II. Plan Fire Fighting Efforts**

Plan (plan) in the PDCA cycle includes all clauses of OHSAS 18001 is considered the beginning of the process of managing an organization that consists of general requirements, Commitment (commitment) and policy (policies) Occupational Health and Safety, Planning (Planning). Planning in clause OHSAS 18001 focuses on how to establish and maintain procedures to identify hazards, assess risks, implement control measures and consider the results of hazard identification and risk assessment in setting purpose Occupational Health and Safety.

## **III. Implementation (Do) Fire Fighting Efforts**

Stages do in the PDCA cycle contains clauses Implementation and operation (Implementation and operation) on OHSAS 18001. Implementation and operation is the implementation of the planning agency Occupational Health and Safety programme in accordance with the requirements of OHSAS 18001.

One implementation of fire prevention system is to ensure the reliability and safety level of the building so that it can be used in accordance with its function, it needs to be equipped with active protection systems, passive protection systems and fire-fighting management application. The third component of this protection is a unity that can not be separated.

**IV. Examination (check) fire prevention efforts**

Stages check the PDCA cycle is the third stage of the management process of this approach. OHSAS 18001 clause mention is checking and corrective action is the implementation of monitoring and measuring performance periodically Occupational Health and Safety. The informant stated evaluation based prevention efforts, emergency response equipment is still not met, because the number of fire extinguishers and laying aparnya not meet the Regulation of the Minister of Manpower and Transmigration No. 04 year 1980, this situation caused the process of implementation of fire prevention efforts are not harmful to the maximum and the team. Internal audit is one of the programs that are routinely carried out. Every six months the internal and external audit standards ISO: 2008, one of which aim to test the reliability of the internal control system. The results of these internal audits will be used as a repair material RSJ which will be followed by an external audit.

**V. Action (Action) Fire Fighting Efforts**

RSJ has made efforts to improve the review and management review. Based on the performance data of the 1st half year report 2013, noted that the efforts to strengthen the monitoring and evaluation of one of them is the management review conducted every 6 months. Based on the results of management actions Riview is organized fire fighting effort. One of the results of the management review is the use of fire extinguisher training for all employees of hospitals and provision of fire-fighting facilities.

**VI. Follow-up and Recommendations Identification Fire Fighting Efforts**

Follow-up and drafted recommendations based on findings at each stage of the PDCA cycle. The PDCA cycle will make it easier to classify the findings on the OHSAS 18001 clause Further findings will be aligned with the standards, and established in accordance with the recommendation that the contents of the clause or other regulations. The following is a table 5:12 recommendations regarding follow-up and fire-fighting effort.

**Table 1: Follow-up and Recommendations Efforts Fire at RSJ Radjiman Wediodiningrat 2014**

Stages management system	The finding	Follow-up	recommendations
<b>Plan</b>	Hazard identification has not been done.	Identification carried by the team PK3RS	OHSAS section 4.4.7.2 the identification of potential emergency situations by mentioning that the necessary procedures to identify potential emergency situations that may impact on the K3 and the need to consider an emergency condition that can be associated with specific activities, equipment or workplace. To Regulation No. 50 Year 2012 on the implementation of safety management systems and occupational health, article 9, paragraph 3 states that the K3 plans to produce planning should consider the identification of potential hazards, assessment and control of risk.
	Investigation of the accident has not been done	Doing documenting the incidence of accidents, as well as the capacity of the hospital to investigate appropriate and involve the authorities.	OHSAS on the 4.5.3 the incident investigation, nonconformity, corrective action and preventive measures mentioned that a good system should perform well investigations that will provide the best opportunity to prevent the said incident happening again and identify opportunities for proactive development, and improving K3 consciousness as a whole.
<b>Do</b>	Fire prevention procedures are often forgotten	Socialization procedure	In OHSAS section 4.4.7.3 regarding the preparation and implementation of emergency response procedures mentioned emergency procedures need to be made as clear and concise as possible in order to facilitate the pengimplimentasiannya when emergency situations occur. Such procedures also need to be ready to be implemented by emergency service providers. Emergency procedures are stored in a computer or other electronic devices will not be read when the power is off, therefore, the procedure needs to be supervised to ensure that printed put in place that is easy to read.



	Communication with the management of fire is not maximized	To disseminate the attachment after emergency number	Regulation of the Minister PU No. 20 Year 2009 concerning the technical guidelines for the management of fire protection in the urban section 3.2, sub-section 2, point e, states that to implement fire management requires management agreement including systems and communication protocols are standardized.
<b>Evaluation (Check)</b>	Evaluation of emergency response equipment have not been implemented	Carry out inspection and evaluation on a regular basis.	OHSAS in section 4.4.7.4. regarding emergency response equipment mentioned that type, number, and location of emergency response equipment storage needs to be evaluated as part of the review and testing of emergency procedures.
	The number of emergency response equipment is not enough	Coordinating emergency response equipment to complete the	OHSAS in section 4.4.7.4. regarding emergency response equipment mentioned equipment should be available in sufficient quantities and stored in a location that is easily accessible, protected and safe from damage. This equipment should be checked and / or tested for feasibility periodically to ensure that the equipment can be operated properly in the event of an emergency situation. It is also stated in Regulation of the Minister No. 04 of 1980 concerning the terms of installation and maintenance of fire extinguisher.
	The placement of fire extinguishers unknown team	APAR appropriate adjustments legislation placement	Regulation of the Minister No. 04 of 1980 concerning the terms of installation and maintenance of fire extinguishers light of article 4 of the installation of APAR, paragraph 1 states that any one or group of fire extinguisher should be placed in a position that is easily seen with a clear, accessible and retrieved and is equipped with marking installation.
	Personal protective equipment is not available extinguishing team	To coordinate the team needs to complete the brigade	Standard OSHA 1910 subpart L App A, on Fire Protection, stated that daruta response personnel should be provided personal protective equipment for fire memdamkan. OHSAS in section 4.4.7.4. mention of the emergency response equipment special attention should be given to the equipment used emergency response personnel. They need to be informed of the limitations of PPE and are trained on how to use them.
<b>Action</b>	Emergency response training is not maximized	Conducting training and socialization training program.	Government Regulation No. 21 of 2008 regarding the implementation of disaster management, sub 5 article 1 states that education and training is not conducted in a disaster situation, and in article 14, paragraph 2 of training in the form of formal education, non-formal, and informal training in the form of primary, secondary, technical, simulations, and drills. OHSAS in section 4.4.7.5. Emergency response training organization needs to identify the requirements mentioned in the training of emergency response personnel and ensure that such personnel have received training. Emergency response personnel must have the competence and ability to carry out a given task.
	Evaluation of training is not maximized	Establish an evaluation team training.	OHSAS stated in section 4.4.7.6 periodic testing of the emergency procedures need to be performed to ensure that the organization and the external emergency can provide appropriate treatment to emergency situations and K3 at limiting or reducing the impact of emergency situations.

	Not done emergency drill	Carry out emergency drills on a regular basis, as well as forming the right scenario.	OHSAS stated in section 4.4.7.6 can be used as an emergency exercise to evaluate emergency procedures, equipment and training premises emergency line increased awareness of the emergency protocols. Internal parties (such as employees) and external (such as Sub-personnel) can be included in his training to increase awareness and understanding of emergency response procedures.
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Based on an initial review found two things that have not implemented the maximum risk hazard identification and accident investigation. The Government of Indonesia has launched a Government Regulation (PP) No. 50 of 2012 regarding the implementation of the Safety Management System and Occupational Health. PP No. 50 The year 2012 has been set at 12 April 2012 in Jakarta. PP is an implementing regulation of Article 87 of Law No.13 Year 2003 Implementation of K3 in the agency management system broadly follows the PP 50 In 2012, however in the operational implementation of the study used standard OHSAS 18001. Hidrant number 4, with 1 main pump and electric powered diesel pumps and jockey pumps. Type hidrant owned hospitals are hidrant park, because the character of the building is owned hospitals do not like multi-storey building in general. Treatment of a fire hydrant pump has performed periodically according to a schedule determined by the team Occupational Health and Safety.

Number of Light Fire extinguisher (APAR) that is available is the number of 86 pieces 6 Kg, 25 Kg 3 pieces. APAR is currently estimated to number more than that recorded, because there are additional Occupational Health and Safety has not been recorded by the team. APAR number is enough to make a small-scale outage or early stage ignition. It is powered by a fire extinguisher inspection program each month to determine the condition of APAR. In an effort to provide early warning of fire danger sign RSJ Radjiman Wediodiningrat has 1 alarm fire, with the buttons in the laundry, nutrition, pharmacy, laboratory. Each room contained APAR placement distance of less than 15 meters so it has to comply with Regulation No. 04 / Men / 1980 on the Terms Installation And Maintenance Fire Light Brigade. Each fire extinguisher has been given a sign in accordance with the Ministerial Regulation No. 04 / Men / 1980, a sign pointing triangle length 35 cm, height 35 reads Light Fire extinguisher.

Evaluation of emergency response equipment including the amount is not maximized, the type of personal protective equipment and fire teams. Performance measurement and monitoring of programs and activities related to the Occupational Health and Safety is not all implemented. Evaluation and follow-up reduction programs are also not optimally implemented. According to NFPA, an examination of the readiness of fire prevention should continue to be evaluated on a regular basis. Examination is not only done to the infrastructure, but also on human resources and fire fighting facilities.

Based on the evaluation can be seen that the case of fire equipment available, but the amount is still not enough to do with effective fire-fighting at that time. Besides the equipment, in terms of evaluation, the team put the fire extinguisher and K3 are not well based Permenakertrans (Regulation of Minister In Indonesia) 1980 No. 04 This led the team that will perform outage trouble. In addition to the application APAR is not maximized, then put out a team that has not given personal protective equipment outages.

Fire prevention actions conducted by RSJ Radjiman Wediodiningrat implemented based program that has been compiled. Programs that are executed on a regular basis about the training. In addition, other activities include, emergency drill was planned. Based on OHSAS 18001, the action taken in the response to the fire is the management review or a review of the programs that have been implemented. RSJ has made efforts to improve the review and management review. Based on the performance data of the 1st half year report 2013, noted that the efforts to strengthen the monitoring and evaluation of one of them is the management review conducted every 6 months. Based on the results of the management review is structured action fire-fighting effort. One of the results of the management review is the use of fire extinguisher training for all employees of hospitals and provision of fire-fighting facilities.

In theory the implementation of management review can not be separated from the function of monitoring, planning, and mobilization (Gunawan, 2008). In RSJ Radjiman Wediodiningrat management review or evaluation function has been implemented. Implementation of the management review process started from an analysis of data collected in the Occupational Health and Safety programme implementation. Leaders will regularly hold meetings with PKRS team to discuss problems encountered during the implementation of the Occupational Health and Safety programme. Leader together with his team, will make decisions and solutions to problems are found. Decisions and solutions that have been determined to always be monitoring and evaluation, and compared with the planning that has been compiled

Based on this research, the main action is implemented educational programs and conduct fire prevention training. Implementation of educational programs and training of fire prevention is to raise awareness of fire safety and emergency capability in the face of fire.

The second action is to make sure there is an exit sign and fire fighting equipment storage area clear (glow in the dark). This is especially true because most people will panic when faced with emergency fire and smoke covered location that can hinder vision. So with a clear sign and can be seen in the dark state can assist people in finding a safe way out. The third action is to fire and evacuation training on a regular basis. Fire training and fire evacuation can help employees to familiarize themselves in the face of fire emergency response also to raise awareness of employees in terms of fire safety.

**Based on direct observation can be explained:**

1. RSJ Radjiman Wediodiningrat have emergency doors located in all treatment rooms.
2. Illumination is sufficient because the intensity is 150 lux.
3. There should be a way to the emergency exit instructions described on each floor so that people can find a way out with ease if a fire is usually accompanied by smoke.
4. Training room on the third floor should have emergency stairs because it is on the third floor.

**IV. CONCLUSIONS AND RECOMMENDATIONS**

1. The results of the investigation showed that the aspect of man (man) assessment and evaluation of fire prevention training in team fighting not running optimally.
2. The system of fire prevention efforts implemented under the clause of OHSAS 18001 with PDCA approach has been fulfilled but still need improvement in aspects of hazard identification (HIRADC), investigation, fire management procedures, communication, evaluation tools, and training.
3. Follow-up and recommendations for RSJ Radjiman Wediodiningrat is complementary to the active fire protection systems, training and evaluation of fire control efforts

**Advice can be given based on this study are:**

- a. Subclause Fulfillment by implementing OHSAS 18001 HIRADC and investigations or evaluations as the basis for the preparation of the target objective programe and corective action request.
- b. Implementation of the system of fire prevention training curriculum and competency with the evaluation and emergency drills on a regular basis.

**REFERENCE**

- [1]. Adams, E.E.. 1976. Accident Causation and the Management System. American Society of Safety Engineers:USA.
- [2]. Assael, Marc J. & Kakosimos, Konstantinos E. 2010. Fires, Explosions, and Toxic Gas Dispersions. Taylor & Francis: USA.
- [3]. Bates, David W. & Gawande, Atul A. 2003. Improving Safety with Information Technology. The new england journal of medicine. Vol. 348. No. 25. p. 2526-2534 BBC. 2012. <http://www.bbc.co.id>.
- [4]. Bird F.E. & Germain G.L. 1989. Practical Loss Control Leadership. International Loss Control Institute: Loganville, Georgia.
- [5]. Denzin, Norman K. & Lincoln, Yvonna S. 2009. Handbook of Qualitative Research. Sage Publication: California.
- [6]. Depnakertrans. 2004a. Audit Sistem Manajemen Keselamatan & Kesehatan Kerja. Jakarta: Depnakertrans RI.
- [7]. Depnakertrans. 2004b. Module 16 Monitoring Occupational Health and Safety Fire. Jakarta. Depnakertrans RI.
- [8]. Gunawan. 2008. Implementation of Fire Management in PT Schering Plough Indonesia, Tbk Pandaan, Tesis. Surabaya, Public Health Airlangga University.
- [9]. Furness, A & Muckett, M. 2007. Introduction to Fire Safety Management. UK : Elsevier.
- [10]. National Health Service. 2009. Review of five London hospital fires and their management. NHS: London.
- [11]. Occupational Safety and Health Administration. 2010. Safe Maintenance. <http://www.osha.eu> OHSAS. 2008. Occupational health and safety management systems - Guidelines for the implementation of OHSAS 18001:2007. OHSAS Project Group: USA.
- [12]. Saharjo B.H., Syaufina L., Putra E.I., Bahruni, Sunarti e., Nurhayati A.W. 2013. Forest and Land Fire in Indonesia. National Seminar on Disaster Research: Mataram.



- [13]. Tacconi L. 2003. Forest fires in Indonesia: causes, costs and policy implications. CIFOR: Bogor.
- [14]. Ontario Forestry Safe Workplace Association. Incident investigation self guidance package.<http://www.ofswa.on.ca/downloads>.
- [15]. Pusdiklatkar. 2006. Training Module: Fire Behavior. Jakarta: Pusdiklatkar.