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Accident Analysis on Production Section of Pt.X Based On Management System and Specific Control Factor (A Case Study Of Crushed By C-Canal)

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Abstract:- PT. X as a manufactory company was have high risk of accident. Several accident had been happened in PT.X were first aid injury and loss time accident. Some investigations and follow-up had done but similar accidents still happen. The purpose of this study was to identify the causes of the accident (crushed by c-canal) based on management system and spesific control factor. The qualitative approaches was used by a standard mini-MORT as a data collection tool and 5 whys method to explore the root causes. The results showed the cause of the accident was due to organizational influences. Influence of the organization, such as resource management, organizational climate and organizational process. This related to the allocation of limited resources, both human and financial, and material. The Conclusion of this research was the elements of the management system and spesific control factor were inadequate, and the root cause of the accident was on organizational Influences. The company had to consider the approach to safety behavior that occupational safety and health programs by an awareness of the whole management to workers.

Keywords:- management system factor, spesific control factor, organizational influences, mini MORT, 5 whys

I. INTRODUCTION

PT.X was one sector of the manufactory company. It had classified into the company having a high-rate accident. This company has 500 employees and 1500 subcontract-employees. The work system in this company makes the employees have the limit time fixed, and there exists the time for this company to chase the target to fulfill the costumers' needs. Based on the report of the accidents documented by Environment Health Safety Officer during 2008-2012 there had been some cases of the accidents categorized into first aid injury or loss time accident occurred in this company.

During the period of 2008-2012 it was known that the type of loss time accident in which the workers were struck down by the any working materials or equipments had become the repeated accidents in the same location with different workers. This showed that most of the accidents in this type did not occur because of certain workers' carelessness or workers' accident proneness. There had been done some investigations using the company standard such as Event and Causal Factor Analysis (ECFA) and independent investigator (external) using mini MORT after the accident occurred, however, the accidents were still going on.

This company had tried some efforts to prevent the accidents. One of the efforts was doing the investigations to recognize the root cause of the accidents. Based on the previous studies and interviews to the company management conducted by PT.X , some efforts had been done and followed up. However, the depth of the investigation methods used had not got at the root of the problems faced. Besides, referring to some cases analyzed, the follow up conducted had not showed any appropriateness. In this case, the follow up conducted had not been appropriate and the accidents still occurred.

The research conducted by Storbakken (2002)[1] showed that whatever the form of accidents would reflect the management capacity to arrange and prevent the accident. So that, in this study the researcher wanted to evaluate the causes of the accidents using mini MORT and "5 whys" with the expectation to get the supportive correlation, and also it was expected to get the stronger and more efficient and integrated research findings or results. The aim of this research was to learn the factors causing the accidents to the workers based on management system and specific control factor by using mini MORT method and by deepening with "5 whys" method in this company.

II. MATERIALS AND METHODS

This research used a descriptive qualitative design that the researcher tried to describe experiences, symptoms, or events occurred (Denzin & Lincoln, 2009)[2]. This qualitative approach or design was used because this research used mini MORT standard as the tool or instrument to collect the data. This research also used "5

whys" methods to get the root of the problems faced. In this context, the qualitative design or approach would help the researcher to elaborate and describe clear phenomena or events in relation to the causes of the accidents. In addition, through some additional qualitative information, it was expected that some comprehensive descriptions of the events can be gained (Hofmann et al, 2006)[3].

The investigation was conducted in PT.X Surabaya, East Java. The location determination was based on the research problems. It was stated that some working accidents occurred in this company with the first aid injury and lost time accident criteria. There had been done some previous investigation before, but the accidents with the same causes were still going on there. The research had lasted during January to May 2013.

The source of information in this research was the workers including supervisors and management staffs who had undergone some working accidents while working in this company. The workers meant were the workers who took part in the production section or area with totally 6 workers. The workers would be the sources of the data gained with the use of mini MORT standard, and supervisor and management staffs would be the sources of the data with the use of "5 whys" methods to get the root of the problems faced

Sample was took by purposive sampling techniques. The focuses of this research to be investigated were as follows:

1. Amelioration

It was the efforts or recovery or amendments conducted after the accidents.

2. Incidents

It was the descriptions of the accidents occurred because of unwanted energy flow or the condition resulting bad consequences to people or objects.

3. Policy

It was written, up to date and large rules to answer the majority of the problems

4. Implementation

It was the program owned and showed by the company to fulfill the policy implementation

5. Risk assessment

It was the efforts for the management to implement and scrutinize/assess the risks giving the information in relation to the residual risk and the follow up.

The method used to investigate or analyze the causes of the accidents was the descriptive analysis techniques through mini MORT and "5 whys". The researcher preferred using this technique to the others because of this method could give a set of questions that might have led the researcher to find the descriptions about the causes of the accidents based on the category that had been made, so the result will had some complete questions to find the causes of the accidents.

III. RESULT AND DISCUSSION

Mini MORT analysis was done by dividing the diagram into 6 parts. The parts 1-4 described the causes of the accidents from specific control factor, while the parts 5-6 described the accidents from the management system factor. Based on the mini MORT analysis results part 1 to 6 for the case 1 could be arranged a logic diagram. The division of the analysis became 6 parts.

This was aimed to ease the analysis and arrangement of the logic diagram. Each diagram would be marked Less Than Adequate (LTA1) and would be given the red circle mark if one of the criteria did not fulfill the requirement. The criteria mentioned in this research were the red criteria, and there was LTA1 element in it.

3.1 Mini MORT Analysis Results of C-canal Case

A worker (fitter) got an accident when opening C-canal on sheet panel 32 left in Bay 4.1 at 02.30 in the morning (shift 2). After the welding operation finished, C-canal which functions as the T pipe piece supporter was detached by cutting its tug clamp previously, and then it must be pushed with the use of hammer from the top of panel sheet.

Because C-canal was difficult to be detached from the T pipe piece, so the worker (victim) went down to see the bottom part of C-canal which was still adhering on the T pipe piece. C-canal with 75-80 kilograms in weight was suddenly detached from the pipe and stroke down the worker's left leg wearing the safety boot. After that, the worker got the medical treatment in PT. X clinic.

Being indicated with fracture, the worker was recommended to be brought to the hospital to get further or better medication. Referring to the Rontgen result, it was showed that there was a broken bone on the thumb of his left leg. So that, the worker could not work for 14 days.

3.1.1 Mini MORT analysis (Part 1 - Amelioration)

The aim of this part was to know the recovery action after the accident occurs, which could determine the total loss or damage. The factors evaluated include rehabilitation, relation, rescue, health service, prevention

for the second accident, emergency action (Richard, 2004)[4]. Based on the result of the logic diagram, it was known that the basic event within LTA1 was located in the rehabilitation and relation factors.

3.1.2 Mini MORT Analysis (Part 2 - Incident)

In this part, mini MORT analysis may evaluated 3 branches including higher supervision service, functional facility operation, and technical information service. Referring to the logic diagram, it could be seen as follows:

1. In higher supervision service events it was known that the basic event within LTA1 was located in aim/goal, information exchange, investigation and fact finding, the response to the identified risk, sources, sources distribution, and standard and instruction branches.
2. Functional facility operation events could be seen that the basic event within LTA1 was located in the company preparation verification branch.
3. Technical information service events showed that the basic event within LTA1 was located in technical information, supervision system, the data collection and analysis, HAP trigger, and independent audit and evaluation branches.

3.1.3 Mini MORT Analysis (Part 3 - Incident)

In this part, mini MORT analysis evaluated 3 next incident branches in part 2, namely maintenance, inspection, and operation. Based on the logic diagram within LTA1, it could be explained as follows:

1. In personal maintenance-execution-personal work capacity events, it could be seen that the basic event within LTA1 was located in motivation and behavior deviation branches.
2. In inspection branch, it showed that the basic event within LTA1 was located in the plan and procedure branches.
3. Inspection-execution-source events showed that the basic event within LTA1 was located in the time branch.
4. Inspection-execution-personal work capacity events showed that the basic event within LTA1 was located in the motivation and consideration to the behavior deviation branches.
5. Operation events showed that the basic event within LTA1 was located in the plan and procedure branches.
6. Operation-execution-personal work capacity events indicated that the basic event within LTA1 was located in the qualification, training, and motivation branches.

3.1.4 Mini MORT Analysis (Part 4 – barriers and person or object in the energy path)

In this part, mini MORT evaluated barriers branch to the unwanted energy flow. The barriers could be placed in the energy sources such as energy sources and potential target or target personal or object. Based on the logic diagram, it could be explained that

1. In barriers of energy source events, the basic event within LTA1 was located in the design, fabrication, installation, maintenance, and non- practical usage branches.
2. In barriers of person or object events, the basic event within LTA1 was located in the maintenance and usage branches.

3.1.5 Mini MORT Analysis (Part 5 – management system)

In this part, mini MORT analysis evaluated the factors of the management system with the main branch of evaluation, namely, policy, implementation, and risk assessment. With a reference to the logic diagram, it could be explained as follows:

1. In implementation-management system factor events, the basic event within LTA1 was located in information flow, instruction, and delay branches.
2. System management factor-risk assessment-technical information system events indicated that the basic event within LTA1 was located in technical information, supervision system, the data collection and analysis, exact control of HAP trigger, independent audit and implementation branches.
3. Management system factor-risk assessment events showed that the basic event within LTA1 was located in the goal branch.

3.1.6 Mini MORT Analysis (Part 6 – management system)

In this part, mini MORT analysis was the continuation of part 5, which evaluated the branch of observation of safety program and danger analysis process. Safety program observation focused more on whether the observation and other supports in relation to undertake the risk assessment had been provided well or not.

The factors evaluated included higher supervision service, safety program organization, and function block and working scheme. Higher supervision service which was also located in the specific control factor evaluated how to determine whether the support on the risk assessment efforts have been provided well or not

by evaluating the goal, information exchange, investigation and fact finding, standard and instruction, risk and response identified, sources, and sources distribution. Based on the logic diagram, it could be explained that:

1. In risk assessment-safety program observation-higher supervision service events, it was known that the basic event within LTA1 was located in the response to identified risk, goal, sources, source distribution, investigation and fact finding, and standard and instruction branches.
2. Risk assessment system-safety program observation-block function and working scheme branches showed that the basic event within LTA1 was located in the incompleteness branch.
3. Risk assessment system-safety program observation branches showed that the basic event within LTA1 was located in the description and scheme branches.
4. In risk assessment, the analysis process of danger-concept and need branches, the basic event within LTA1 was located in the definition of aim and tolerated risk, procedure criteria, and specification of safety need and the continuous analysis branches.
5. Risk assessment-danger analysis process-development design plan branches showed that the basic event within LTA1 was located in the human factor, energy control determination, inspection plan, arrangement, emergency determination, operational specification, content, and independent scrutiny methods, documentation, and common design process branches.

3.2 Mini MORT Analysis and 5 whys of Case 1 (C-canal Getting Born Down)

After being conducted the analysis using mini MORT, the branch within LTA had been known and then been implemented with the "5 whys" analysis. The information was gained from HSE manager, and then this information was confirmed by the data and document owned, and also referred to the observation conducted. The question was underline on the existence of unsafe (question 2), precondition for unsafe (question 3), unsafe supervision (question 4), and organizational influence (question 5). The answers resulted from LTA category would be used as the basis of the primary analysis of the "5 whys", and on the table of summary would only present the fifth answer of the '5 whys" analysis. It was because the 5 whys were supposed to be the basic causes of the accidents which would complete the results of the mini MORT analysis.

The branches of which the LTA was known would be continuously implemented with the 5 whys. The fifth element of HFACS was organizational influences including resource management, organizational climate, and organizational process. Based on the results of the 5 why analysis, it was known that the basic cause of the accidents was influenced from the organization.

VI. DISCUSSION

Based on the results analysis that had been arranged in the logic diagram for both accident cases occurred at PT.X, the causes of the accidents based on the management system factors included three primary areas – implementation, risk assessment, and policy. Those three branches were the branches of the management system factor which would lead to the basic event of the accidents.

The accident case occurred at PT.X had some causes referring to the specific control factor. According to Richard (2004)[4], specific control factor can evaluate the condition of environment which has the potential in causing the accidents and understand the foldaway of energy path, but this was not significant to change the analysis process. The amelioration and accident branches were the branches which were evaluated in mini MORT for part 1-4.

Based on several interviews and discussions with the management staffs, the researcher got the answers and meaningful inputs to answer the question "why". Referring to the inputs from the approach management, Human Factors Analysis and Classification System (HFACS) were more appropriate to be used as the base to answer the questions "why" in each analytical question. Through this approach, the researcher got the results that organizational influences were the bases of the accidents.

Through the 5 why analysis of the second case, it was known that the root of the problems causing the accidents was organizational influence aspects which involved three things in it – resource management, organizational climate, and organizational process. Those three aspects also represented the management system factor and specific control factor which was previously evaluated by using mini MORT.

The research conducted by Erawati (2012)[5] who also investigated the analysis of C-canal getting born down used mini MORT and found that there was a weakness at specific control factor and management system factor, however, by using this method only her research results did not mention clearly the root of the problems in the logic diagram of mini MORT.

The company had also done the analysis for the case of getting fallen down from the stairs, using event and causal factor analysis (ECFA), but the results of the investigation had not dug deeply the organizational influences in relation to the accidents. ECFA had better be conducted very soon after the accident to collect the factual evidences which were related to the accidents order and determine the amelioration (Buys and Clark,

1995)[6]. However, the usual results attained were not complete and had the weakness, so that it needs the continuous analysis and additional facts to find the root of the problem. Therefore, it needs the investigation.
Based on the analysis using both mini MORT and 5 why for both cases, it could be determined the causes of the accidents based on the specific control factor and management system factor, and also it was known that the root of the problems from the organizational influences. The weaknesses from both two cases need long enough time to conduct the analysis and determine the causes of the accidents. However, if compared with the previous researches, the use of the two methods would be stronger in digging or getting the root of the problems on the accidents. So that, there would be some better follows up.

By using the two investigation tools of the causes of the accidents or accident analysis, the accidents that may occur in the future can be prevented by doing the follow up actions on the LTA1 elements and the 5 why. The management sides can recover and prevent the same accidents in the future.

IV. CONCLUSION

Based on the data analysis used of mini MORT and 5 why methods, it could be concluded as follows:.

a. Management system factor became the cause of the accidents categorized into Loss Time Accident 2). This was because in the risk assessment there were LTA factors including safety program assessment, technical information system, goal, and danger analysis process branches. While in the implementation branch, there was an LTA factor which included the instruction branch (directive in the two cases. And also it was not available to attain the goal of management to minimize LTA2.

b. The specific control factor became the causes of the accidents in the production session or area in PT.X. This was because in the two cases there was some factors classified LTA – amelioration, incident (unwanted energy flow), and barriers.

c. The organizational influences including resource management, organizational climate, and organizational processes were the causes of the passive accidents which influenced directly the actions and work attitudes that could cause the working accidents.

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The suggestions that could be given to the company, readers, and respondents were as follows:

1. The company would consider getting the appropriate approach on each unavailable element (LTA) such as safety behavior. So that, the work safety and health program can be implemented with the realization from all parties in the company.
2. The company would consider doing the increase of resource allocation either human resources, financial, or facility in order that the policy and program of work safety and health can be implemented maximally.
3. This research could also be used as the reference to conduct other researches by combining the different instruments or tools. So that the root of the problem can be found more deeply.

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