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INTEGRATING STANDARD OPERATING PROCEDURES AND OCCUPATIONAL SAFETY FOR COLUMN CONCRETE REINFORCEMENT WORK

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ABSTRACT

Complex construction projects need a system to manage occupational safety, besides many other construction issues. With the range of systems that easy to apply by the workers, it can be estimated that construction projects run well. In every construction project there is always standard operating procedure at each work stage, and if the big project and government owned, surely the occupational safety systems were also available, but these systems are not integrated with one another. The purpose of this research is to integrate between column implementation method and occupational safety system into quality system or standard operating procedures.

To create standard operating procedures, we used the data from the first result of validation by interview, developed a flowchart and elaborated it in a descriptive form, and then re-validated the data to obtain the final result. The data we used to integrate the occupational safety procedures as a major factor and the column implementation method was obtained from the company.

For this research, we used primary and secondary references, previous studies, literature, interviews with several sources at different projects, and a company. The generated data in the form of the implementation of column work along, and the data of the occupational safety procedures, were then integrated. The results of this study created a standard system for safe operations necessary to protect human life by preventing accidents to be understood by all.

Keywords : Implementation methods; Occupational Safety; Quality; Column

1. INTRODUCTION

Construction industrial is the scope of areas relating most firms to risk and uncertainty compared with the other industrial fields. Numerous disabling injuries and fatalities occur on the workforce who works at the construction site each year (Schaufelberger and Lin, 2014). The various causes of occupational risk in construction projects are matters relating to the unique characters in between difference of location, extroverted and affected by the natural conditions, the limited time, and so on, as of physical readiness as endurance, exactitude, awareness of personal safety are indispensable. Although standards have been developed globally to provide for safe working practices at construction sites, construction remains a high-risk livelihood and accidents are common (Kayumba, 2013). All the stages of construction from the beginning to finishing can be said always contiguous with the risks affected to four principles of project that is quality, cost, time and occupational safety.

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Occupational safety is the main concern for all construction industry professionals. Disabling injuries and fatalities is risk to anyone who works on or is in the sites of a construction project (Griffith, 2001).

According to Griffith (2001), occupational safety management was a conventional existed superficial as a production sites activity, and now it turn out to be a general consideration and integrated responsibility of owner's liability across the construction process. It has also become an integral part of many organizations who contribute to the all construction process.

Workplace accident is a major risk threatening the safety of workers in construction industry. Labor is the main asset of a company, without them, certainly activity of an organization and company cannot be held. Including a construction project, building construction will not be able to stand without the labor. Therefore, occupational safety is one of the factors that should be maintained for the continuation of the activities and the final goal of company in any field.

The safety risk is the main topic in this paper. A disabling injury or fatal accident on the job site has negative impacts on operations at many levels. Because of the type of work involved in construction, many dangers exist especially for the worker in which they were directly involved in a development project. For this reason, the subject of safety offers one area non-controversial mutual interest between management and the work force. The necessity of safe operating, protecting and conserving life by preventing accidents can be understood in general. The contractors have to accept the liabilities related to the hazardous construction sites and make a proper commitment to accident prevention (Halpin, Daniel. and Woodhead, Ronald, 1998).

Practices procedures and standards have a particularly important role to be applied in the construction industry, especially when being used to integrate with implementation based safety rules. There are no visual procedures to supervised such rules, it is important that an example of best practice to be given (Lingard and Rowlinson, 2005).

In the construction industry, responsiveness of workforce to the procedures on the job is an important thing to be considered and implemented. Trough reason of this system is one of the factors the smooth passage of a construction project, without management of operational systems, it can be established that the construction project will not be going well as planned.

Good construction companies employ dedicated safety officer who develop company safety policies and procedures, conduct training programs, and supervise project sites professionally (Schaufelberger and Lin, 2014).

An operational systems related to safety standards is a factor that general entry into any part in a construction project, including the cost, time and quality which raises the effect of loss if neglected, therefore, part of the work handled by each labor systematically important to be implemented in accordance with the guidelines, including the use of safety equipment along with the methods that must be understood in accordance with the system.

The previous researchers only did the research limited on safety, standards operating system development, and quality. The present study aims to make those three points to be integrated with a column structure as the object.

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2. METHODOLOGY/ EXPERIMENTAL

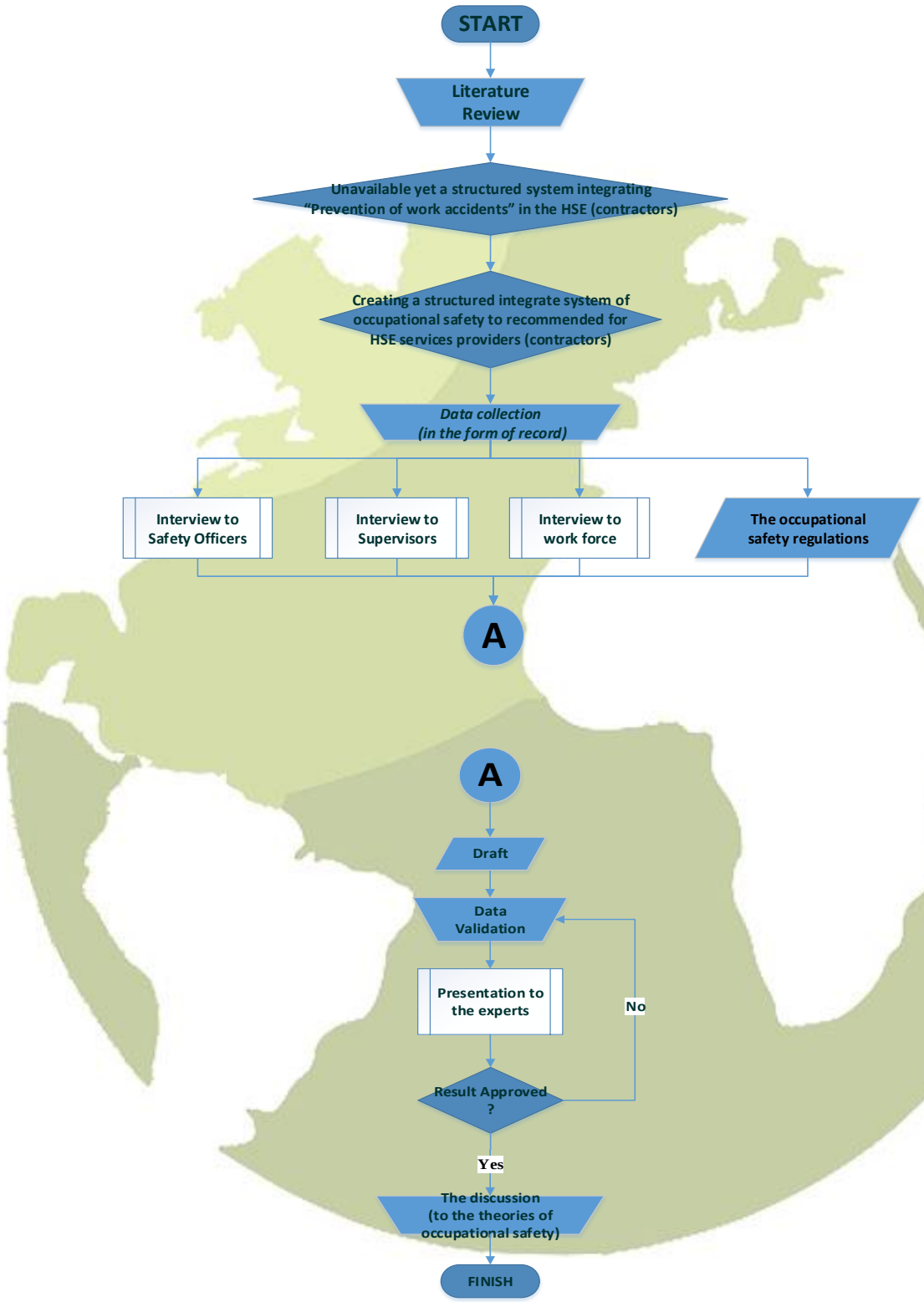

Figure 1 The Method Flowcharts Research of Integrating Standard Operating Procedures and Occupational Safety for Column Concrete Reinforcement Work

Based on the formulation of the problem obtained, the main purpose of this research is to create a structured system of the standard operating procedures integrated for the work reinforced concrete column.

In Indonesia, we have adopted the world-recognized safety regulations as modern technology, and this has resulted in a reduction in the fatality rate within recent years. However, the improvement in the safety record achieved by the construction industry still lags seriously behind that achieved in other hazardous industries. An important question that remains unanswered is whether the contractor has responsibility to ensure that everything possible is done to provide a safe working environment for the work force and the public in general.

2.1 Regulations Used

The regulation means the prescribed that are designed to minimize the possibility of an unsafe behavior or conditions arising. Many different standard safety regulations have been issued by various organizations, and the followings were used as reference for this study:

1. The Occupational Safety and Health Act (OSHA) passed by Congress in 1970, this act established mandatory safety and health procedures to be followed by all firms in interstate commerce.
2. SNI (Standar Nasional Indonesia), rule about the safety management
3. OHSAS (Occupational Health and Safety Management Systems) : 18001, about the safety management. The most common standard is widely adopted (referenced) by many companies (organizations) in carrying out the implementation of Safety Management System and Occupational Health in the management of the organization (company) is concerned.
4. SMK3 (Sistem Manajemen Keselamatan dan Kesehatan Kerja), approved by the Indonesian government regulation No. 50, 2012.
5. Quality Management System ISO 9000:2000 (Suardi Rudi, 2004)

2.2 Resource

We used two main methods in order to integrate reinforced concrete column work with occupational safety. The data collection process is required for reaching the desired goal. The data collection basically is a step in collecting data as input for troubleshooting. The methods used such as:

1. Primary Data (Field Research)
   This data obtained from the interviews to experts in the field (running project) and occupational safety form systems. This research was conducted to obtain the data by direct observation approach by interview and to submit the data for validation of some structural and occupational safety on running construction project. Then the data retrieval held at company and field. The object of research is the field work. The object of research is the work of a column, reviewed based on the opinion of several experts structures (not direct observation). The opinion given by the structural and occupational safety experts will be concluded in the form of Standard Operating Procedures.
2. Secondary Data (Library Research)
   The data as complementary information is in the form of literature from the previous research, relating to standards operating procedures, occupational safety system, and the method of reinforced concrete column. This research is a method to obtain the

information about the relating theories with subject matter which is obtained from the literature, lectures, and also other print media. Library research was also used to get an idea of the theory which can be used in the research so that the result obtained has the scientific quality.

The following steps were used to integrate the primary and secondary data collection:
1. Interview withthe occupational safety heads, implementers, and the supervisors at the project.
2. Describe the entire interviews result in descriptive form.
3. Combine the interview, and integrate the information into the a flowchart
4. Revalidate the data to the some experts at the project
5. Set the processed data in the form of SOP flowchart as an output system

3. RESULTS

This preliminary study is an initial exploration of issues related to a proposed quality review or evaluation. The research was started by collecting the literature references from the previous research on occupational safety and standard operating procedures. We interviewed three sources on different projects, consisting of the supervisor, implementer, and the head of occupational safety. The interviews were conducted with some questions about the quality of occupational safety.

In this research, the preliminary study was started by making a detailed study of column work. The assumptions used were reinforced concrete columns in multi-storey buildings as a method of column work which is considered quite risky for safety of worker.

After the study of the method of the implementation of work column was complete, the next step was to conduct a study of occupational safety regulations using a combination of regulatory standards both national and international standards. The draft (Appendix 1) has been presented to the experts and the result still needed to be revised and revalidated by the presentation to the experts until valid.

This research used assumptions about column type and method of construction and visualizing location of the column relative to black spot construction location during the implementation of the work for a reinforced concrete column in a multi-storey building. A simple flowchart of the SOP was produced based on the assumptions, visualization, and literature. The result of this SOP can then be used at the beginning of the validation phase to produce the final SOP validated by the interviewees at project sites to be compared with the worldly recognized rules. The interviewees that we designated were purposively, by the following criteria:
1. Educational in civil engineering
2. More than 5 years experiences as a safety officer or supervisors at construction sites
3. Certified experts
4. In this research, the experts are coincidentally working for the government-owned contractors.

4. DISCUSSION

The site of construction project has many spots which are dangerous. Based on the data of accident, there are many workforce got injuries and fatal accidents in some places at construction sites; known as the blackspot construction (Griffith, 2001).

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"This is role of the code of practice, and any employer providing a system of working that is as safe as the code of practice can generally be assumed to be complying with the legislation. The same applies to standards that cover levels attainment to which we have to aspire. The key concept, really performance based legislation, is setting goals and monitoring the achievement of those goals. If achievement is not taking place then it has to be made. The codes of practice give us starting point; one would expect to see a process of continuous improvement so that the organizations would enhance the standards presented by the codes and, eventually, the codes should be revised to reflect this enhance performance" (Lingard and Rowlinson, 2005)

According to Lingard and Rowlinson (2005), we conclude that codes of practice similar with the standards operating procedures (SOP) are parts of the quality. As we know, basically, the principle of the project consists of three aspects, namely quality, cost and time. Safety is an important part of the third principle. Even in some articles or research at the last few years it is said that the ultimate goal of the project is to obtain cost performance, quality, time and safety to the maximum. The three principles plus safety are obtained by performing a process of planning, scheduling, executingand controling that more accurate and detailed than the previous process.

Welty (2013) stated that the SOP has four major sections; introduction of material, actions and responsibility, approvals, version history.

1. Introduction of Material
   In our research, it means we pronounce about every single thing of method of column concrete reinforcement work.
2. Actions and Responsibilities
   These two are the essential contents in SOP. There should be a person who is responsible for the implementation (action) of each job. Every part of the job is consecutive, and must be correctly implemented. The person in charge is necessary for the completion of the process of each part of the jobs in accordance with the procedure.
3. Approvals
   An approval is very needed for validation of this research. In this process, we would re-validate the SOP until it is said to be approved by the experts (safety officers and site manager).
4. Version History
   According to the Welty (2013), version history of the procedure, which facilities the reconstruction of that history when needed. We believe that our research is the first study, so to do the reconstruct, regulations contained would be necessary.

Of the above statement, there is no doubt that the actual safety is a core part of the success of a project in addition to three other aspects. The principles relate to one another, the association of these princples can be seen in the following figure.

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Figure 2 Illustration of Relations between Occupational Safety and Triple Constraint

In this research, there will be an integration of safety in standards operating procedures of work of reinforced concrete column.
Operational standards are parts of the quality. Quality issues are the responsibility of each area of the organization involved in the project; it is seen from the fact that the product or installation works are areas of organization to handle. So all parties concerned not only have the responsibility of carrying out the task assigned to him, but also must carry out their duties properly and appropriately in terms of quality. In other words, all parties must always be oriented to the quality (Soeharto, 1995)
Standards Operating Procedures (SOP) is essentially made to avoid miscommunication, conflict, and problems in the implementation of work. SOP is also the written instructions that describe exactly how the worker carrying out the job. This research intend to identify, analyze, and create a Standards Operating Procedures (SOP) / working procedures to incorporate the elements of safety as part of the Standards Operating Procedures (Integrated). Since the work is carried out entirely by the main contractor, the staff will be responsible for the implementation of safe working methods at each stage of the work and should plan in advance for any hazardous activities (Thompson, 1995).
We note that the result of this research is in the form of flowcharts and descriptive qualitative. The SOP developed in this study applies only to the construction of columns and not to the construction of other building elements. We recommend that the construction managers and HSE supervisors in Indonesia consider adopting these structured SOPs for construction of the column elements of multi-storey buildings.

5. CONCLUSION

Based of the preliminary research has conclude that there is not yet an available Standard Operating Procedure which refers to the safety and integrated with the implementation method, as the quality of a construction project for a guidance to the workers at / in around construction project.

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7. REFERENCES

Gibb, Alistair and Thompson, Trevor. (1995), Total Project Management of construction safety, health, and environment. Thomas Telford, Leicester.

Griffith, Alan. and Howarth, Tim., (2014), Construction health and safety management, Routledge Taylor & Francis Group., New York, NY 10017, USA.

Haider, Syed Imtiaz. (2001). Validation Standard Operating Procedures. Publisher CRC Press LLC. United States of America.

Halpin, Daniel. and Woodhead, Ronald., (1998), Construction management, John Wiley & Sons, Inc., Hoboken, New Jersey, USA.

Kayumba, Akwilina (2013). Construction Work and Occupational Safety and Health. Finnish Institute of Occupational Health Topeliuksenkatu 41 a A FI-00250 Helsinki, Finland.

Lingard, Helen and Rowlinson, Steve (2005). Occupational Health and Safety in Construction Project Management. Spon Press, Canada.

Ramli, Soehatman. (2009). Pedoman Praktis Manajemen Risiko dalam Perspektif K3 OHS Risk Management. Dian Rakyat. Jakarta.

Rudi, Suardi. (2004). Sistem Manajemen Mutu ISO 9000:2000. PPM. Yogyakarta.

Soeharto, Iman. (1998). Manajemen Proyek (Dari Konsptual Sampai Operasional) Jilid 2. Erlangga. Jakarta.

Soeharto, Iman. (1995). Manajemen Proyek. Erlangga. Jakarta.

Schaufelberger, John and Yu Lin, Ken., (2014), Construction Project Safety, John Wiley & Sons, Inc., Hoboken, New Jersey, USA.

Welty, Gordon (2013). Working with Standard Operating Procedures (SOPs), Woodhead Publishing Series in Biomedicine, Philadelpia, USA.