Factors Affecting the Effectiveness of the Implementation of Application OHSMS: A Systematic Literature Review

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Abstract. Occupational health and safety management system is a system used to manage Occupational Health and Safety. The implementation of OHSMS aims to create a work environment that is free from harm or illness due to work. However, along with the development of OHS, it is not accompanied by an increase in OHS performance. It can be seen from several studies that there is no difference in OHS performance between certified and non-certified companies. Many factors affect the effectiveness of OHSMS implementation. The purpose of this study is to investigate factors influencing the effectiveness of OHSMS implementation through a systematical literature review. This study reviewed articles published between 2010 – 2020 from 4 search portals, namely: Scopus, Proquest, Science Direct, and Sage. From the result of literature search, there were 40 articles that met the criteria. The results of this study indicate that there are internal and external factors that affect the effectiveness of OHSMS implementation. Internal factors that influence the effectiveness of OHSMS implementation are management commitment, OHS leadership and policies, employee participation, OHS culture, employee morale, sufficient resources, financial performance, OHS cost allocation, company size, internal incentives, worker safety behavior, communication and consultation OHS, OHS rules and procedures, OHS promotion, integration, continuous improvement, the process of identifying hazards and risk reduction, developing and implementing OHS risk control strategies. Meanwhile, external factors include enforcement of OHS regulations, OHS support and authority, external audit certification, external incentives, pressure from customers, market competition, company image, and international trends.

1. Introduction

The Occupational Health and Safety Management System (OHSMS) is implemented to manage Occupational Health and Safety (OHS), so that a workplace environment is free from undesirable things (25). The OHSMS appeared at the same time as OHS which was started in the 1930s by Heinrich with his dominance theory. There were two perspectives when the OHSMS emerged, namely the insurance perspective and the industry perspective. Insurance perspective means protection from financial losses due to work accidents. This was the first appearance of Heinrich’s domino accident theory, in which he analyzed a large number of industrial accident reports. He found that indirect losses were greater than direct losses with 4: 1 ratio (28). While from an industrial perspective, safety means there is no accident occurs in the workplace. Accident prevention is the main objective of implementing OHSMS because accidents not only result in financial loss but also company reputation.
Work accidents rate in Indonesia is still high, in 2017, the number of work accidents reported was 123,041 cases; while in 2018, it reached 173,105 cases with a nominal compensation of 1.2 trillion rupiahs. Krishna Syarif, Director of BPJS, stated that the reported accident cases were still dominated by accident cases in the factory environment and have not been evenly distributed to other industries which also have a high-risk level (BPJS 2019). This means that the number of work accidents in Indonesia is very large even though the implementation of OHSMS has been started.

To prevent the occupational accidents rate and occupational illness effectively, an integrated system is needed from the top management level to operational workers in the field. The implementation of OHSMS has proven effective in preventing accidents and especially the fatality rate. Previous study showed that the occupational accident rate in construction companies that adopted KOSHA 18001 was 67% lower than companies that did not implement KOSHA 18001. In addition, they also showed that the fatality rate was 10.3% lower (55).

However, there are many obstacles faced by companies in implementing OHSMS such as management errors in making decisions, absent of or ineffective information and communication related to OHS, and prioritizing production over safety (8). In addition, the supervision of OHSMS norms from the Ministry of Manpower related to the implementation of OHSMS in Indonesia has not been optimal. Anita (2016) stated there are inhibiting factors in the supervision of OHSMS implementation, namely the lack of labor inspectors compared to the number of industries and the absence of special OHSMS monitoring instruments from the government.

OHSMS performance measurement and OHSMS activity monitoring are used to determine whether the system is functioning according to its standards and to help evaluate the effectiveness of the entire system (ANSI Z10). It needs clear indicators to measure the effectiveness of OHSMS. The general effectiveness of the OHSMS is evaluated by means of compliance audits and performance evaluations. In this case, compliance audit is based on OHSMS standards and audit methods. Performance evaluation is difficult to apply to OHSMS because the key indicators in OHSMS are not easy to identify and monitor and there is no principle how specific OHSMS indicators should be (25).

Robson et al in their study examined the effectiveness of implementation OHSMS through evaluation of 3 outcomes, namely implementation, intermediate outcome, and final outcome. Implementation means seeing how the level of OHSMS implementation in the company, and it is measured through audits to see the conformity of OHSMS based on existing standards. Intermediate outcomes see the mediators of change between OHSMS implementation and its outcomes including safety climate, employee knowledge, beliefs, values or perceptions, OHSMS behavior. Meanwhile, the final outcomes include accident rate and economic outcome (45).

Meanwhile, according to Haas and Yorio, measurement indicators are needed to measure the performance of OHSMS in evaluating the effectiveness of the entire system. These indicators are the basis for measurement and monitoring of processes in OHSMS. They review OHSMS performance indicators through a survey of OHSMS elements and their implementation and identify 3 categories of indicators, namely organizational performance, worker performance, and interventions. Researchers want to identify what factors influence the effectiveness of OHSMS implementation in improving OHSMS performance (13).

2. Methodology
This study uses a systematical literature review method, following an input-process-output approach. This involves sequential steps in finding, collecting, knowing, understanding, analyzing, synthesizing and evaluating appropriate references to become the foundation for the topic being written. This study was conducted from May 2020 to July 2020. The unit of analysis of this research is the literature of several research results regarding the factors that influence the effectiveness of OHSMS implementation published in international journals including Science Direct, Scopus, Sage, and Proquest. The research steps are based on the Prism diagram starting from the process of identifying articles, selecting articles, eligibility of articles, and synthesizing data (11).
Research Questions (RQ) are used to guide the research. At this stage, design criteria are used Population, Intervention, Comparison, Results, and Context (PICOC). For this research can shows at Table 1. The RQ for this study can be seen in Table 2. The research concept can be seen in Figure 2.

Before the literature search, the specific keywords must first be determined and based on PICO. Researchers look for publications on search engines and filter the database of online searches including Science Direct, Scopus, Sage, and Proquest. The data collection method used is the documentation method. The data collection steps were obtained from the Full Open Access Library, Universitas Indonesia. The data required include title, abstract, full text, research questions, research objectives, research methods, and research results.

Inclusion criteria means criteria that are included in the research analysis, while exclusion criteria include criteria that are not included in the research analysis. Inclusion and exclusion criteria can be seen in Table 3.

Each literature goes through a selection stage with the following conditions: First, the literature must go through the selection stage, title review, and abstract. Second, the selected literature must go through a full text review selection.

A study of quality was carried out to see whether the articles obtained have good quality (53). Thus, one of the important things in conducting literature reviews is evaluating the quality of the data.
in the study articles. Things that must be questioned are what methods were used to collect the data, whether the data came from reliable and relevant sources, and whether the data were valid and reliable (11). The indicators of the quality of the articles set by reviewers are (1) having a clear description of the measurement of factors for the effectiveness of OHSMS implementation, (2) having research methods, measurement methods, and clear research measurement tools, (3) population and sample of the research are clear, (4) there is a match between the objectives of the research and the results of the research carried out, and (5) the measuring instrument uses the validation process. If those five criteria are met, the article will be processed for data extraction and data synthesis.

### 3. Result and Discussion

From 12613 articles, there were 40 articles included in data extraction and synthesis. From the results of data synthesis, it was found that there were internal factors and external factors that influenced the effectiveness of OHSMS implementation. Internal factors are the factors within the organization, while external factors are factors outside the organization.

| No | Authors | Year | Factors affecting the effectiveness of OHSMS implementation |
|----|---------|------|----------------------------------------------------------|
| 1  | Nordlof et al. | 2017 | Company size, safety culture, creditworthiness |
| 2  | Ghabramani | 2016 | Management commitments, OHS communication, employee engagement, integration, OHS training, OHS culture, internal incentives, external incentives, OHS law enforcement, support from OHS authorities and external audits |
| 3  | Ramli et al. | 2011 | Development of OHS programs and policies, processes for hazard identification and risk measurement, development and implementation of risk control strategies |
| 4  | Rajaprasad et al. | 2015 | OHS culture, continuous improvement, employee morale, OHS training, conducive work environment, management commitment and OHS policies |
| 5  | Nawangsari & Sutawijaya | 2016 | Organizational commitment, OHS leadership, OHS culture, communication |
| 6  | Anna Sklad | 2019 | OHS leadership |
| 7  | Garnicaa & Barrigaa | 2018 | Personnel behavior, strict legal requirements, insufficient personnel involved in activities, bureaucracy, ineffective information collection systems, management behavior, lack of awareness of the relevance of OHS by workers, absent of or ineffective information, ineffective communication, production priorities on top of safety, inadequate OHS policy |
| 8  | Chen et al. | 2010 | External factors: requirements from customers, meeting international trends, market competition, requirements of trade associations, regulatory requirements, increasing market power, awards from the government |
| 9  | Li et al. | 2018 | Internal factors: enhancement of company image, requirements from TOP management, improvement of OHS, reduction of financial risk from damage impacts, reduction in the frequency of work accidents |
| 10 | Masso | 2015 | The keys to the successful implementation of OHSAS 18001: TOP management promise and support, continuous improvement, worker participation, OHS training and education, integration of OHS personnel performance and operational performance |
| 11 | Mohannadfam et al. | 2016 | OHS policy, management commitment, employee participation, and policy reform, OHS program planning, allocation of program objectives and sources of funds |
| 12 | Mei et al. | 2018 | Social behavior and proactive worker safety |
| 13 | Lonascu et al. | 2017 | OHSMS certification |
| 14 | Rajaprasad et al. | 2015 | Safety culture, safety performance, continuous improvement, management commitment, conducive work environment, employee morale, OHS regulation and OHS training |
| 15 | Ismail et al. | 2012 | OHS communication and awareness |
| 16 | Bevilacqua et al. | 2016 | The desire to improve the company’s image, long bureaucracy, the lack of experts and expensive certification costs, monitoring carried out by external parties, and recognition of employees |

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| Table 3. Inclusion and Exclusion Criteria |
|-----------------------------------------|
| **Inclusion Criteria**                  |
| Literature was published in the period 2010-2020 |
| Literature is written in English, complete, and can be accessed |
| Literature is a research article and can answer research questions about the factors that influence the implementation of OHSMS |
| **Exclusion Criteria**                  |
| Literature was published beyond the period 2010-2020 |
| Study of literature reviews and articles that cannot answer research questions such as the implementation of OHSMS and its effects |

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Internal factors that affect the effectiveness of OHSMS implementation include management commitment, OHS leadership and policies, employee participation, OHS culture, employee morale, sufficient resources, financial performance, OHS cost allocation, company size, internal incentives, safe behavior of workers, communication and consultation. OHS, OHS rules and procedures, OHS promotion, integration, continuous improvement, hazard identification and risk reduction processes, and development and implementation of OHS risk control strategies

Meanwhile, factors from outside the organization that affect the effectiveness of OHSMS implementation include the enforcement of OHS regulations, OHS support and authority, external audit certification, external incentives, pressure from customers, market competition, corporate image, and international trends.

The sociotechnical approach proposes that the factors of the occupational health safety management system are divided into three subsystems, namely the social subsystem, the technical subsystem, and the external subsystem. Organizational and personal are social subsystem. Meanwhile, Physical hardware, software, technology, process and work factors are technical subsystem (46).

Based on the sociotechnical theory, internal factors can be divided into organizational factors, personal factors and technical factors. Organizational factors are management commitment, OHS policies, OHS cost allocation, financial performance, company size, internal incentives, and sufficient resources. Personal factors include OHS training, employee involvement, OHS culture, worker morale, manager competence, proactive and proactive behavior, fear of punishment, pressure from workers and trade unions. Meanwhile, technical factors include OHS communication, OHS rules and procedures, OHS promotion, system integration, continuous improvement, uncertainty in reporting systems, hazard.
identification and risk reduction processes, and development and implementation of risk control strategies.

However, from the findings of this systematical literature review study, no physical factors were found, either hardware, technology, or software. In fact, technology or hardware is one of the first things that must be designed in the workplace. Makin and Winder (2009) introduced a new model of the OHSMS framework concept, namely: safe place, safe person, and safe system. Safe place involves extensive capital because it is more difficult to improve safety if it has not been included at the beginning of the workplace design. Therefore, if the initial design phase does not take into account the safety aspect, and if there is an unsafe condition it is difficult to change the design, technology or hardware will be used.

4. Conclusion

This literature review aims to identified the factors that influence the implementation of OHSMS. The inclusion and exclusion criteria that have been designed show that 40 studies on the factors affecting OHSMS implementation between 2010 and 2020 examined in this literature review have been conducted as a systematic literature review. The results of this study show that there were internal factors and external factors that influenced the effectiveness of OHSMS implementation. Internal factors that affect the effectiveness of OHSMS implementation include management commitment, OHS leadership and policies, employee participation, OHS culture, employee morale, sufficient resources, financial performance, OHS cost allocation, company size, internal incentives, safe behavior of workers, OHS communication and consultation, OHS rules and procedures, OHS promotion, integration, continuous improvement, hazard identification, risk management processes, and design and implementation of OHS risk control strategies.

Meanwhile, technical factors include OHS communication, OHS rules and procedures, OHS promotion, system integration, continuous improvement, uncertainty in reporting systems, hazard identification and risk reduction processes, and development and implementation of risk control strategies.
Chart 1. Factors Affecting the Implementation of OHSMS using the Sociotechnical Systems approach

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