



Evaluation of Occupational Safety and Health Management System at Lab Test Lembaga Air Perak

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Abstract. All industries including the government organizations have to follow the Occupational Safety and Health Act (OSHA) 1994 which required the employers to perform minimum duties to ensure the safety, health and welfare of their workers, and joint the responsibilities between employer and employees. With the aim to evaluate the occupational safety and health management system at lab test Lembaga Air Perak a quantitative cross-sectional descriptive survey research was conducted at the laboratory test department of Lembaga Air Perak located at Ipoh in the Kinta district from the 4th October 2021 till the 31st March 2022. The data were collected in two phases; The first phase, the consented laboratory worker was interviewed using a pretested structured questionnaire as a guide focusing on the demographic characteristic and the sources and types of hazards encountered by them throughout the working period. On the second phase researcher naturalistic observe the participant and laboratory implementation towards the occupational safety and health management system based on Lembaga Air Perak Laboratory Quality Manual. This research found most of the participants are Laboratory Assistant with the median age of 39 years old and have been working between one to three years. Majority of the participants implement to occupational safety and health management system in general and within 12 elements been observe the laboratory fail to implement two of the requirements of the Lembaga Air Perak Laboratory Quality Manual. This study hypothesized that the occupational safety and health management system been implemented well at the laboratory of Lembaga Air Perak. This study provides a conceptualization of safety culture that can be used in future study.

Keywords: Occupational Safety and Health Management System · laboratory · implementation

1 Introduction

National Occupational Accidents Statistics 2020 by the Department of Statistic Malaysia shown that the number of reporting occupational accidents in year 2020 was 32, 674 cases compared with year 2019, 40,811 cases was reported [1]. The same report also shown that the pattern of the accidents rate in Malaysia was decreasing years by years

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[1]. The employers of all industries including the government organizations cannot feel relieve to see this data because as we witness how the COVID-19 pandemic changes our daily life substantially the statistical decline of the accidents rate in Malaysia may due to the measures of closure and restrictions imposed by the government on economic activities to overcome the spread of the COVID-19 and the Department of statistics Malaysia reported the total working hours dropped till 28.2% [1]. However, employers of all industries including the government organizations have to follows the [9]. This Act states that employers and employees are responsible for safety and health practices in the workplace [9]. Thus, there is no exception for the Lembaga Air Perak organizations.

Lembaga Air Perak is a corporation that been established on January 1990 under the Lembaga Air Perak Enactment 1988 [2]. The purpose of Lembaga Air Perak been established was to provide clean water supply services in the state of Perak which included more than 2.5 million people. Lembaga Air Perak is the third largest water operator in Malaysia after Selangor and Johor [2]. Thus, it is very important for the Lembaga Air Perak to have a laboratory that safe from potential hazard such as chemical, biological, physical and also safety hazards. Safety awareness is very wide concepts that refers to the avoidance and know of any kind of accident leading to harm or injury to human beings [3].

To be the best benchmark in Malaysia, Lembaga Air Perak had a visionary mission which to provide clean water for the needs of all including the population in and outside the city as well as the commercial and industrial sectors [2]. This shown that Lembaga Air Perak being an efficient and also responsible corporation that very concern with the aspect of environmental safety and also want to ensure the human health at the highest quality. In addition, there is a responsibility for an organization to provide a safe system of work for every worker which includes the layout, the raining, supervision, the provision of warning, personal protective clothing, special instruction and methods of work adopted [4]. The laboratory department is one of the important facilities to ensure that Lembaga Air Perak can always achieve their mission and be in a good direction. However, laboratory activities may expose the laboratory employees, and also the public to potential hazardous and toxic chemicals also increase the risk of incidents [5].

Therefore, the Lembaga Air Perak have to make sure their management system that managing the risk in the laboratories. Which included the occupational health, the prevention of any disease related to the laboratory facilities and activities also the protection of the environment always been compliance by all the laboratory employees and aligned with the Standard Operation Manual provided by Lembaga Air Perak.

2 Literature Review

Generally, a hazard can be defined as any source which can be any condition or situation also any behaviour of potential damage, harm or adverse health effects on something or someone [6]. To prevent any hazardous, it must be identified because the unidentified hazards will cause unmanageable risk [7]. Thus, it is so important for an organisation to identify the source also type of hazards in their facilities. There was a way to detect the hazards, based on the literature search this recommended process are applied in the National Institute for Occupational Safety and Health United States, Western Sydney

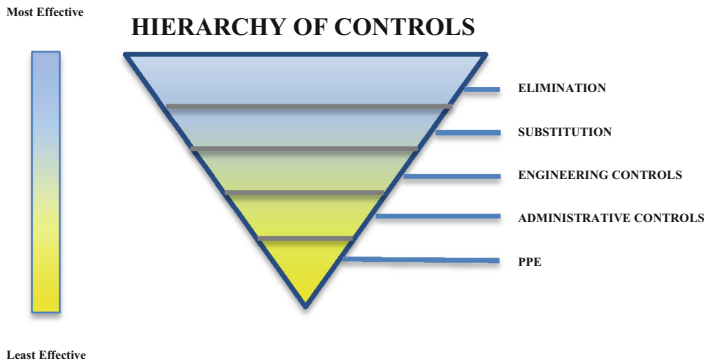


Fig. 1. Hierarchy of Control

University and also at the Department of Occupational Safety and Health, Ministry of Human Resources Malaysia stated in the Guidelines for Hazard Identification, Risk Assessment and Risk. This full process of hazards identification is called Risk Assessment where the organisation needs to evaluate each of work area, work task, situation, items and also thing proactively because anything may have potential to cause harm [8].

Based on Fig. 1 the Hierarchy of Control, the most preferred method of controlling risk is to eliminate the hazard although most of the cases found that the hazards are not possible to be eliminate [10]. Then, it must move to the substitution, where the hazard will be replaced with anything that give no risk or more lower risk [10]. Engineering control also be one of the alternative procedures because is consist of variety ways to minimizing the risk such as enclosure and isolation even though the level of effectiveness controlling the risk was moderate [10]. Policies, guidelines, training and schedule controls are among the Administrative Controls that can be implemented [10].

Focusing on the laboratory, the safety programs involving the laboratory began in the late of 1980s and it required uniformity and continuity throughout the facilities such as chemical labelling and the ways of reporting any accidents or exposure [31]. Safety is the most import element in management of laboratory science [32]. Besides that, Occupational Safety and Health also want all the laboratory staff to subcommittees to ensure shared expertise and tasks including the risk management, hazardous material, infection control, laboratory safety, life safety involving utilities equipment and radiation and many more [8]. Surprisingly, 93 cases accidents related to exposure to or contact with harmful substances or radiation reported by National Occupational Accident 2020 [1]. If the Occupational Safety and Health management system being priorities over the past decade, why the accidents still occur.

Accidents can easily happen in the laboratory if the level of implementation towards safety when working in the laboratory are low. The safety must be practicing once the worker entering the laboratory especially during conducting any experiment or any laboratory works. Safety rules in the laboratory should be observed. Workers should be responsible to avoid accidents [12]. The security and safety unit state that the laboratory is expose with high risk for accidents, injury and may cause disease as a result of the work conducted in the laboratory especially involving the use of chemical if it been

handled in unsafe manner [13]. The accidents happened have significant relationship with negligence, the lack of knowledge especially on the works that been carried out as well as damage or failure either on materials, equipment and chemical used [14].

There are many factors that can influence the level of implementation of occupational and health system. From the side of government, they already provide a guiding act; Occupational Safety and Health Act 1994 as the major law that provide the provision on area including the employer's responsibilities providing a safe working environment, an appropriate training also a very good preparation to face any type of emergency [15]. Now, it clear that the top management commitment is one of the important factors that influences the level of implementation and execution of the Occupational Safety and Health Management System. Management's involvement and engagement in actions towards was the management commitment in order to achieve a goal [16].

However, there are situations that organizations face as a barrier to implement the occupation and health system. To maintain the system all the time it required high cost that must be bear by the organisation [17]. Sometime, there will be a need to changes or updating the procedures for improvement. Training is also always given however the employee still ignores the procedure [18]. Here, the leader must take an appropriate action. Leaders always concern about their leadership [19]. Thus, before an organization must overcome all the barrier before making any decision to implement any new system to ensure the organization productivity still running efficiently and safe for [20].

3 Methodology

The study mainly incorporates was a quantitative cross-sectional descriptive survey research design. With the aim to evaluate the occupational safety and health management system at lab test Lembaga Air Perak this study was conducted at the laboratory test department of Lembaga Air Perak located at Ipoh in the Kinta district from the 4th October 2021 till the 31st March 2022.

The data were collected in two phases; The first phase, the researcher used a pretested structured questionnaire as a guide to direct an interview and the second phase, the researcher used an observation checklist referring to the Laboratory Quality Manual. This study involved two sampling technique. The first sampling technique involving the participation among laboratory workers. By using formula with finite population estimating a proportion with the setting of precision level 5%, confidence level at 95% and adapting the assumption that 50% of the laboratory worker have implement to the occupational safety and health management system. However, there is no sample size calculation needed in due to the small number of populations.

where,

$$n = \frac{NZP(1-P)}{d(N-1) + ZP(1-P)}$$

n = Sample size with finite population correction

N = Population size

Z = Statistic for a level of confidence

P = Expected proportion (if the prevalence is 20%, $P=0.2$)

D = Precision (if the precision is 5% then $d = 0.05$)

The second sampling technique for this study involving the facilities sampling. With the objective to evaluate the level of implementation of occupational safety and health management system at Lab Test Department of Lembaga Air Perak, researcher also interest in linked the facilities with analytics value to see the practices of occupational safety and health management system in all the laboratories of Lembaga Air Perak. The data collection of this study was carried out in two phases thus there are two different data collection instruments. In the first phase, the researcher used a pretested structured questionnaire as a guide to direct an interview. In the second phase, the researcher used an observation checklist referring to the Lembaga Air Perak Laboratory Quality Manual. Table 1 showed the sources and types of hazards or hazardous situations provided.

The returned questionnaires and also the observational list was encoded by hand to ease data entry and to minimize errors. The collected data analysed using with Statistical Package for Social Science (SPSS version 22.0 for windows). Descriptive analysis been used to describe the demographics and baseline characteristic of the respondent. Mean and standard deviation presented the normal distributed continuous data, meanwhile categorical data presented in frequency and percentage.

Table 1. The Sources and Types of Hazards Encountered by The Participant at The Laboratory

Types of Hazards	Sources of Hazards
Chemical: <i>Waste spills</i>	Hazardous chemical waste spills at the time pouring
Chemical: <i>Waste spills</i>	The occurrence of waste leakage
Working environment: <i>Confined space hazard</i>	Inhalation of strong acid vapor in the laboratory
Chemical: <i>Toxic</i>	Skin contacts with strong acid material
Energy: <i>Electrical</i>	Leakage of current on electrical
Radiation: <i>Expose to radiation</i>	Skin or eye disorder due to the exposure to any radiation
Working environment: <i>Falls, trips, slip etc.</i>	Falling or slippery during the working in the facilities
Working environment: <i>Worker behaviours</i>	Use improper devices, equipment tools or material
Energy: <i>Acoustic/noise</i>	Expose to the noise that more than 80 dB

4 Data Analysis and Result

Table 2 summarizes the socio-demography characteristics of all the study participants. With the median age of 39 years old (IQR: 16.75) and the number of male and female participants are equal which 4 (50.0%) person respectively. Half of the respondent have been working in the laboratory between one to three years ($n = 4$, 50.0%) and majority of the participant's was designation in the laboratory of Lembaga Air Perak was Laboratory Assistant ($n = 3$, 37.5%).

Table 3 shown the frequency and percentage of the sources and type of hazards encountered by the participants throughout their working period at the laboratory of Lembaga Air Perak. Half of the participants experienced the hazardous chemical waste spills at the time pouring ($n = 4$, 50.0%) and also the occurrence of waste leakage ($n = 4$, 50.0%) respectively. However, majority of the participants do not encounter the moments of inhalation of strong acid vapor in the laboratory ($n = 6$, 75.0%) and leakage of current on electrical ($n = 5$, 62.5%) but experience their skin been contacts with strong acid material ($n = 5$, 62.5%).

Table 4 below shown the level of implementation of occupational safety and health management system among the participants. Research used the Lembaga Air Perak Laboratory Quality Manual as the references to categories the participants either implement toward the manual or not. First, the researcher observes the level of implementation towards the general laboratory safety rules which contain 15 rules under this section such as it is forbidden to enter the laboratory without any arrangements, no eating, drinking and smoking in the laboratory and it is forbidden to work alone in the laboratory without supervision. However, majority of the participants do not implement the general laboratory safety rules ($n = 5$, 62.5%).

Table 2. Study Participants' Characteristics

Characteristics	Statistic, n (%)	
Age (median in years)	39	(16.75) ^a
Gender		
• Male	4	(50.0)
• Female	4	(50.0)
Duration working in lab test department Lembaga Air Perak		
• Less than 1 years	1	(12.5)
• Between 1 to 3 years	4	(50.0)
• More than 3 years	3	(37.5)
Respondent's designation		
• Science officer	1	(12.5)
• Assistance science officer	2	(25.0)
• Laboratory assistant	3	(37.5)
• General assistant	2	(25.0)

Table 3. Sources and Types of Hazards Encountered at Laboratory

Types of Hazards	Sources of Hazards	Encounter, n (%)		Do not Encounter, n (%)	
		n	(%)	n	(%)
Chemical: <i>Waste spills</i>	Hazardous chemical waste spills at the time pouring	4	(50.0)	4	(50.0)
Chemical: <i>Waste spills</i>	The occurrence of waste leakage	4	(50.0)	4	(50.0)
Working environment: <i>Confined space hazard</i>	Inhalation of strong acid vapor in the laboratory	2	(25.0)	6	(75.0)
Chemical: <i>Toxic</i>	Skin contacts with strong acid material	5	(62.5)	3	(37.5)
Energy: <i>Electrical</i>	Leakage of current on electrical	3	(37.5)	5	(62.5)
Radiation: <i>Expose to radiation</i>	Skin or eye disorder due to the exposure to any radiation	4	(50.0)	4	(50.0)
Working environment: <i>Falls, trips, slip etc.</i>	Falling or slippery during the working in the facilities	3	(37.5)	5	(62.5)
Working environment: <i>Worker behaviours</i>	Use improper devices, equipment tools or material	2	(25.0)	6	(75.0)
Energy: <i>Acoustic/noise</i>	Expose to the noise that more than 80 dB	6	(75.0)	2	(25.0)

Table 4. The Level of Implementation of Occupational Safety and Health Management System Among Participants.

Characteristics	Implement, n (%)		Do not Implement, n (%)	
	n	(%)	n	(%)
General laboratory safety rules	3	(37.5)	5	(62.5)
Personal Protective Equipment				
• Lab Coat	7	(87.5)	1	(12.5)
• Respirator	6	(75.0)	2	(25.0)
• Face Protection	5	(62.5)	3	(37.5)
• Hearing Protection	6	(75.0)	2	(25.0)
• Mask	5	(62.5)	3	(37.5)
• Gloves	5	(62.5)	3	(37.5)

Table 5 below shown the general level of implementation of occupational safety and health management system among participants. From the results of Table 4.3.1, the participants who implement to majority of the categories will categories as implement to occupational safety and health management system in general. This study showed that majority of the participants implement to occupational safety and health management system in general (n = 6, 75.0%).

Table 6 below shown the level of implementation of occupational safety and health management system at the laboratory. Research used the Lembaga Air Perak Laboratory Quality Manual as the references to categories the laboratories at the Lembaga Air Perak either implement toward the manual or not. There are only three laboratories at the Lembaga Air Perak. First, the researcher looks up into the First AID Equipment. There are four elements under this category. However, only one of the laboratories implements the First AID box safety rules (n = 1, 33.3%). The second categories were safety rules and electrical equipment maintenance and electronics. This category contained four elements. All of the laboratories implement the general safety rules (n = 3, 100%). The

Table 5. The General Level of Implementation of Occupational Safety and Health Management System Among Participants.

Characteristics	Implement, n (%)		Do not Implement, n (%)	
General level of Implementation of Occupational Safety and Health Management System among participants.	6	(75.0)	2	(25.0)

Table 6. The Level of Implementation of Occupational Safety and Health Management System at The Laboratory.

Characteristics	Implement, n (%)		Do not Implement, n (%)	
First AID Equipment				
• First AID box	1	(33.3)	2	(66.7)
• Eye wash	2	(66.7)	1	(33.3)
• Fire extinguisher	3	(100.0)	0	(0.0)
• Fire blanket	1	(33.3)	2	(66.7)
Safety Rules and Electrical Equipment Maintenance and Electronics				
• General safety rules	3	(100.0)	0	(0.0)
• Electrical and Electronics Equipment Maintenance	2	(66.7)	1	(33.3)
• Computer rules	1	(33.3)	2	(66.7)
• Short circuit	3	(100.0)	0	(0.0)

(continued)

Table 6. (continued)

Characteristics	Implement, n (%)		Do not Implement, n (%)	
Safety rules for high-risk equipment in the laboratory				
• High temperature equipment	3	(100.0)	0	(0.0)
• Vacuum equipment	2	(66.7)	1	(33.3)
• High pressure equipment	2	(66.7)	1	(33.3)
• Gas compressor equipment	1	(33.3)	2	(66.7)

last categories were safety rules for high-risk equipment in the laboratory. This category contained four elements. There are many safety rules under this element and one of it was ensure the laboratory have an adequate workspace to ensure safety during operation.

5 Discussion and Conclusion

This research can summarize that most of the participants are Laboratory Assistant with the median age of 39 years old and have been working between one to three years. The sources and type of hazards encountered by the most of participants throughout their working period at the laboratory of Lembaga Air Perak was the hazardous chemical waste spills at the time pouring, the occurrence of waste leakage, their skin been contacts with strong acid material, either skin or eye disorder due to the exposure to any radiation and also been expose to the noise that more than 80db. The results of the evaluation on the level of implementation of occupational safety and health management system among the participants shown that majority of the participants do not implement the general laboratory safety rules.

[21] state that demographic factors affects the studies conducted on the occupational and health system management. However, this study was focusing on the participants characteristic as the factors that influences implementation of occupational safety and health management system at Lab Test Department of Lembaga Air Perak. The results of this study as same as the results of study by [22] reported no significant differences on the studies conducted. Meanwhile, study by Hastings et al. (1995) found that work performance is closely related to demographic factors [23]. Congruent with the study by Sattler and [24] and [23] that discovered the female employees complied with warnings. Besides that, [25] also believe female employees were found more perceive that the occupational safety and health management system elements are critical to effective occupational safety and health management system practices.

The study also states employees are forced to comply with safety and health regulations [26] because the employee does not follow the given rules while working [27]. These results may be the consequence of the relationship between employee pessimism and poor safety performance [28]. In addition, if the management put the blames to the employee for injury and accident, occupational safety and health management system

performance will decrease [29]. For that reason, employers always give priority preference to practice for that reason, an organizational culture/climate is vital in determining that employees and employers give a high priority to safety and health practices. [30] found from previous research that the leadership of the organization needs to play a major role in safety, as management is accountable for most “human ware” problems. However, this was a limitation for this study because this study did not capture the how important the employee’s behaviour and responsibilities will affect the implementation of occupational and health management system among the employers. However, they implement the lab coat safety rules, respirator safety rules, face protection safety rules, hearing protection safety rules, mask safety rules and gloves safety rules.

In this study the level of implementation of occupational safety and health management system at the laboratory also been evaluate. Within 12 elements that been observe, the results shown that the laboratory of Lembaga Air Perak do not implement the elements under the First AID equipment which the fire blanket and also the element under safety rules and electrical equipment maintenance and electronics which was related to computer rules. Although only two out of 12 elements that do not fulfil the requirement of the Lembaga Air Perak Laboratory Quality Manual, the risk was still there and it should not happen to the laboratory that has recognized the MS ISO/IEC 17025:2005 Accreditation Certified under Laboratory Accreditation Scheme Malaysia (SAMM). To overcome this situation, everyone must take responsibility to ensure their working environment was safe.

References

1. Department of Statistic Malaysia. (2021). Big Data Analytics: National Occupational Accidents Statistics 2020. Release July 22, 2021 from https://www.dosm.gov.my/v1/index.php?r=column/cone&menu_id=dUgyTTIBYitlSVVrbkUveXVsZVRNZz09
2. Lembaga Air Perak. (2021). Corporate profile. <https://www.lap.com.my/v4/>
3. Shaari, Z., & Soebarto, V. (2013). Investigating sustainable practices in the Malaysian office building developments. *Construction Innovation*, 14(1), 17–37.
4. Soehod, K. & Laxman, L.K.P. (2007). Report on Law on Safety and Health in Malaysia. Universiti Teknologi Malaysia. Retrieved from <http://eprints.utm.my/2660/1/71777.pdf> Assessed on 26 March 2015.
5. Ritch, D. & Rank, J. 2001. Laboratory safety in the biology lab. *Bioscene* 27(3): 17–22.
6. Leggett, D.J. 2012. Lab-HIRA: Hazard identification and risk analysis for the chemical research laboratory part 2. *Risk Analysis of Laboratory Operations* 19(5): 25–36
7. F. K. W. Wong et al., “Article information,” *J. Eng. Des. Technol.*, vol. 7, no. 2, pp. 130–142.
8. Department of Safety and Health (DOSH) (2008). DOSH website. Retrieved January 28, 2008, from <http://dosh.moh.gov.my>
9. Occupational Safety and Health Act (Act 514). (1994). Malaysia.
10. National Institute of Occupational Safety and Health. (2020). <https://www.dosh.gov.my/index.php/legislation/guidelines/general/597-04-guidelines-on-occupational-safety-and-health-management-systems-oshms/file>
11. National Institute of Occupational Safety and Health. (2021).
12. Azizi, Y., Nordin, Y., Jasmi, I., Zainudin, S., Muhammad Sukri, S., Azlina, M. K.
13. Heron, R. J. L., (1999). Audit and “Responsible Care” in the Chemical Industry. *Occup. Med.*, 49: 407–410.

14. Tharaldsen, J. E., Mearns, K. J., & Knudsen, K. (2010). Perspectives on safety: The impact of group membership, work factors and trust on safety performance in UK and Norwegian drilling company employees. *Safety Science*, 48(8), 1062– 1072. <https://doi.org/10.1016/j.ssci.2009.06.003>
15. Shaluf, I. and Fakhru'l-Razi, A. (2003). Major hazard control: the Malaysian
16. Cooper, D. (2006). Exploratory Analyses of the Effects of Managerial Support and Feedback Consequences. *Journal of Organizational Behaviour Management*. 26: 41–82
17. Beckmerhagen, I. A., Berg, H. P., Karapetrovic, S. V., & Willborn, W. O. (2003).
18. Zutshi, A., & Sohal, A. S. (2005). Integrated management system: The experiences of three Australian organizations. *Journal of Manufacturing Technology Management*, 16(2), 211 – 232.
19. Machin, M. A. (2005). Predictors of coach drivers' safety behaviour and health status. Paper presented at the 2nd International Conference in Driver Behaviour and Training, 15–17 Nov 2005, Edinburgh, Scotland. Retrieved December 20, 2007, from www.usq.edu.au/users/mac hin/Machin.2005.pdf
20. Vassie, L., Tomas, J. M., & Oliver, A. (2000). Health and safety management in UK and Spanish SMEs: A comparative study. *Journal of Safety Research*, 31(1), 35–43.
21. Kuenzi, M., & Schminke, M. (2009). Assembling fragments into a lens: A review, critique, and proposed research agenda for the organizational work climate literature. *Journal of Management*, 35, 634–717.
22. Thomas, T. L. (1999). Evaluation of training technique as a means of influencing safety knowledge, risk perception and proper respirator donning ability among respiratory protection users. Master Thesis. Faculty of the Virginia Polytechnic Institute and State University. Retrieved October 20, 2008, from <http://scholar.lib.vt.edu/theses/available/etd102599151953/unrestricted/TraciThomas.pdf>
23. Rose, J., & Schelewa-Davies, D. (1997). The relationship between staff climate in residential services. *Journal of Intellectual Disabilities*, 1, 19 – 24.
24. Sattler, B., & Lippy, B. (1997, May 23). Hazard communication: A review of the science underpinning the art of communication for health and safety. Retrieved May 20, 2009, from <http://www.osha.gov/SLTC/hazardcommunications/hc2inf2.html>
25. Malle, B. (1996). Issues in social and personality psychology. Retrieved May 20, 2009, from <http://darkwing.uoregon.edu/~bfmalle/issues/q9.html>
26. Carvalho, M. (2008, June 22). Number of workplace accidents going down. *The Star*. Retrieved from <http://thestaronline.com/>
27. Health and Safety Executive (HSE) (2005). A review of safety culture and safety climate literature for the development of the safety culture inspection toolkit. Retrieved March 20, 2007, from <http://www.hse.gov.uk/RESEARCH/rpdf/r367.pdf>
28. Oyan, T. (2000). Putting optimism into your safety program. *Occupational Hazards*, 62(1), 66 -69.
29. Erickson, J. A. (2000). Corporate culture: The key to safety performance. *Occupational Hazards*, 62(4), 45–50.
30. Lin, J. and Mills, A. (2001). Measuring the occupational health and safety performance of construction companies in Australia. *Facilities*. 19: 131–138.
31. Christian, M. S., Bradley, J. C., Wallace, J. C., & Burke, M. J. (2009). Workplace safety: a meta-analysis of the roles of person and situation factors. *The Journal of applied psychology*, 94(5), 1103–27. <https://doi.org/10.1037/a0016172>.
32. Hogan, J., & Foster, J. (2013). Multifaceted Personality Predictors of Workplace Safety Performance: More Than Conscientiousness. *Human Performance*, 26(1), 20–43. <https://doi.org/10.1080/08959285.2012.736899>

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