Diagnosis of poor safety culture as a major shortcoming in OHSAS 18001-certified companies

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Abstract: The evaluation of safety performance in occupational health and safety assessment series (OHSAS) 18001-certified companies provides useful information about the quality of the management system. A certified organization should employ an adequate level of safety management and a positive safety culture to achieve a satisfactory safety performance. The present study conducted in six manufacturing companies: three OHSAS 18001-certified, and three non-certified to assess occupational health and safety (OHS) as well as OHSAS 18001 practices. The certified companies had a better OHS practices compared with the non-certified companies. The certified companies slightly differed in OHS and OHSAS 18001 practices and one of the certified companies had the highest activity rates for both practices. The results indicated that the implemented management systems have not developed and been maintained appropriately in the certified companies. The in-depth analysis of the collected evidence revealed shortcomings in safety culture improvement in the certified companies. This study highlights the importance of safety culture to continuously improve the quality of OHSAS 18001 and to properly perform OHS/OHSAS 18001 practices in the certified companies.

Key words: Safety performance, Safety culture, Management commitment, Certification, Manufacturing

The evaluation of safety performance in an adopting organization is one of the important requirements of the Occupational Health and Safety Management System (OHSMS) i.e., the Occupational Health and Safety Assessment Series (OHSAS) 18001 that provides useful information about the quality of system[1, 2]. An organization certified by OHSAS 18001 should employ an adequate level of safety management and a positive safety culture, which reflects the visible commitment of management to safety in order to achieve a satisfactory safety performance[3, 4]. Previous studies indicated that the effective safety management depends on the existing safety culture and on safety management practices[5, 6]. Both OHSMS and safety culture are required to achieve safe practices in an OHSMS-adopting organization. Without a positive safety culture, an OHSMS tends to be a 'paper exercise' in a company[7].

Many researchers attempted to define the factors that constitute a good safety culture in an organization. However, there is no widely accepted definition and constructs for safety culture[8–10]. Safety culture can described as learned behaviors reflecting safety management practices[11] and behaviors in relation to safety in an organization[12]. It reflects the observable efforts or practices that conducted by all organizational members towards improving OHS on a daily basis[13]. The aspects of safety culture include management commitment to safety[4, 14–17], employee involvement[4, 9, 15, 17, 18], safety communication[16, 17–20], safety training[15, 16, 17, 20–23], reward system[24], reporting system[23, 24], employee empowerment[24], policies and procedures of safety management system[9], pressure for pro-

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duction[16], local work practices and supervision[22], and the existence of a learning culture[18]. The existence of a strong safety culture has been demonstrated to have a positive influence on safety performance in many industrial settings[14]. Moreover, the practices of an OHSMS-adopting company to improve safety culture may positively impact the quality of the systematic management of safety and the safety performance.

A certified organization should apply systematic means to achieve and maintain a high level of safety performance[25]. The evaluation of safety management factors is a preferred approach for the assessment of safety performance, and provides information regarding failures of ongoing safety programs prior to the occurrence of an accident[26]. Application of an active monitoring system can measure the success of a certified management system before accidents occur and can reinforce the achievement of the organization in a positive way[27]. Failure to do the proper analysis of safety performance in a certified organization may ignore the existing shortcomings of an OHSMS and lead to the occurrence of adverse events.

Safety performance is traditionally evaluated through the application of statistical methods for analysis of accident or injury data. The indicators of accidents or injuries include number, frequency, severity, rates, and their costs that are usually referred as *lagging* (retrospective) indicators. These indicators focus on safety outcomes and measure the failures of safety programs. Recently, *leading* (prospective) indicators such as safety audits and hazard identification have been applied by OHSMS adopting organizations to measure the success of a system[28–30]. Although it is common to separately employ the lagging and leading indicators for measurement of safety performance[6, 31–34], Cooper and Phillips[28] suggested the application of a combination of these indicators for measuring the impacts of safety programs on an organization. These indicators are also considered to be long-term measures of safety culture[35]. Hohnen and Hasle[36] stated that it is necessary to evaluate a certified management system through the application of scale estimation in the work environment and the qualitative assessment of the influence of an OHSMS. Certified organizations usually apply the quantitative results of audits to measure the performance of an implemented OHSMS[37].

OHSAS 18001 establishes a framework to consistently identify and control of health and safety risks, reduce the potential for accidents, aid legislative compliance, facilitate safety management, and improve overall performance in adopting firms[38]. In 131 OHSAS-certified companies in Spain, Fernández-Muñiz *et al.*[39] indicated that the senior management commitment and communication positively influenced the safety performance. Vinodkumar and Bhasi[40] studied the safety management practices in eight chemical businesses in Kerala, India and found that employees in firms with OHSAS 18001 had the highest level of safety management practices and better self-reported safety behaviors compared with employees working in non-OHSAS firms. The study of Abad *et al.*[41] in Spanish OHSAS 18001-certified companies revealed that the companies were more likely to exhibit better safety outcomes and higher performance compared to non-certified firms.

OHSAS 18001-certified companies should evaluate the safety performance of their systems internally and externally[1]. However, some fail to conduct proper evaluations. For instance, Chang and Liang[42] stated that most of the OHSAS 18001-certified organizations in Taiwan had compliances regarding the increases of paper work, cost, and the workload of occupational health and safety (OHS). These companies weakly follow the certification and inappropriately evaluate their safety performance. The study of Chen *et al.*[43] in Printed Circuit Board (PCB) manufactures in Taiwan showed that poor personnel cooperation, increased equipment investment, and difficulties in selecting performance indicators were the key influencing failure factors thorough the implementation of OHSAS 18001. In addition, several authors have criticized the application of lagging indicators due to shortcomings such as underreporting and measuring the system failures without disclosing cause-effect relationships for these indicators[28]. Furthermore, Hopkins[44] advised that an OHSMS audit does not guarantee the expected level of safety in a certified organization.

The assessment of the safety literature showed that a limited number of studies published the safety performance of the OHSAS 18001-certified companies using a scientific approach in Iran. Therefore, it is necessary to assess OHS and OHSAS 18001 practices in the certified companies in Iran to provide information about the quality of the management system and to identify existing problems. The present study was conducted after the examination of the effect of OHSAS 18001 on occupational injury[31] and safety climate[45] for evaluating OHSAS 18001 practices and to identify shortcomings of the systems in conformance with the requirements of the standard in the certified companies. This study also compared the OHS practices in the certified companies with a group of non-certified companies.

Method

This research was conducted to analyze the OHS practices in three OHSAS 18001-certified and three non-certified companies in 2011. In addition, OHSAS 18001 practices studied in the certified companies. The companies were manufactures of beverages, chemical, and electrical products, as well as goods used in construction and agriculture and located in the West Azerbaijan province in Iran. The number of employees who worked in the companies varied from 230 to 400. Two of the companies were certified in 2002 and one of them became certified in 2007. The Method for Industrial Safety and Health activity Assessment (MISHA) was used to assess the OHS practices in both certified and non-certified companies[46]. A checklist was prepared considering all requirements of the OHSAS 18001 standard[1] (revision 2007) to assess the compliance level of OHSAS practices with the standard in the certified companies. All questions of the checklists were rated on a four-point scale from zero to three[46] (Table 1).

A series of face-to-face interviews were conducted with four key informants of OHSAS 18001 in the certified companies. These interviewees were asked to describe the practices conducted in the companies for complying with the requirements of the OHSAS 18001 standard. In addition, a total of sixty-five persons, including managers (n=15), supervisors (n=10), and randomly selected workers (n=40) were shortly interviewed in the companies. The participants were asked to explain their awareness about the safety, OHS training experience, and their involvement in the OHS practices. In the certified companies, the participants were also asked about their awareness on OHSAS 18001, their consultation and involvement in the practices conducted by their companies for implementation and maintenance of OHSAS 18001, and what modifications were conducted in their jobs and workstations due to the implementation of the system. Moreover, OHS and OHSAS documents were assessed to identify the compliance with the requirements of the OHSAS 18001 standard and to reply the questions in the MISHA checklists. Walk-through site observations were performed to check the safety status in the worksites and the modifications made as a result of the implementation of OHSAS 18001. The assessments were conducted by the author, who is a senior auditor of OHSAS 18001.

Both quantitative and qualitative approaches were applied to analyzing the findings. Activity rates (*sum of scores for activity area/maximum available scores for activity area × 100*) were calculated for each element of the

Table 1. The requirements and the corresponding scores for questions of the checklists

Requirements	Score
Activity is not at an acceptable level. Rules and modes of actions are determined only verbally. No visible activities can be seen, or activities are only problem-solving in nature.	0 points
Activity is at minimum level. Rules and the methods of action are determined and notified. In some areas, activities are only problem-solving in nature. However, activities are mainly sensible and applicable.	1 point
Improvement process is put into practice. Activity standards and rules are obeyed. They are no notable deficiencies in activities.	2 points
All issues to be considered as put into effect without weakness of deficiencies. A strong improvement process is in use.	3 points

OHSAS 18001 standard and MISHA as well as for total questions of the completed checklists (*sum of scores for activity areas/sum of maximum available scores for activity areas × 100*). The qualitative assessment was conducted using the evidence to identify the shortcomings in the practices of the certified companies to conformance with the requirements of the OHSAS 18001 standard.

Results

The analysis of OHS and OHSAS 18001 practices indicated differences in activity rates among the companies. The result of MISHA showed that Certified 1 had the highest (53.93) and non-certified 3 had the lowest (9.69) activity rates. The activity rate of follow-up element was the lowest rate for all companies, particularly for the non-certified companies (Table 2). The certified companies had a higher activity rates than the non-certified companies ($t_{(4)}=7.17$, $p<0.01$). The non-certified companies did not have a written safety policy and did not conduct any activity to follow-up the safety performance.

The assessment of activity rates for the main elements of OHSAS 18001 indicated that checking and OHS planning had the highest and lowest rates respectively. Certified 1 had the highest and certified 3 had the lowest activity rates. The companies slightly differed in activity rates of the main elements of OHSAS 18001. They had identical rates for review, but certified 1 has a higher rate for OHS policy (Fig. 1). Detailed analysis of the activity rates for sub-elements of the OHSAS 18001 standard indicated that documentation had the highest, but the hazard identification, risk assessment and determining control's item had the lowest rate of activity. The rates of other sub-elements did not noticeably differ between the companies. The companies had identical rates for documentation, control of

Table 2. Activity rates of the elements of MISHA in the certified and non-certified companies

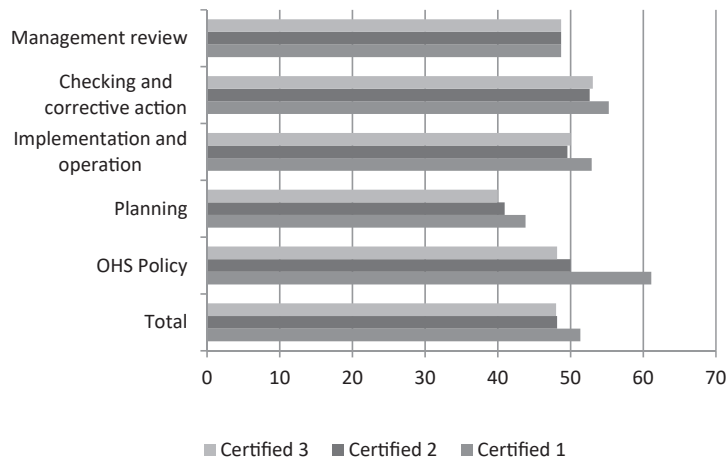|	Certified			Non-certified		
	1	2	3	1	2	3
A. Organization and administration	**62.31**	**52.18**	**50.72**	**13.04**	**14.49**	**5.08**
A1. Safety policy	63.63	57.57	57.57	3	3	3
A2. Safety activities in practice	66.66	50	45.83	29.16	25	8
A3. Personnel management	50	41.66	41.66	8	25	8
B. Participation, communication, and training	**54.54**	**39.39**	**39.39**	**9**	**18.18**	**9**
B1. Participation	55.5	44.44	44.44	11.11	22.22	11.11
B2. Communication	58.33	33.33	33.33	8.33	25	8.33
B3. Personnel safety training	50	41.66	41.66	8.33	8.33	8.33
C. Work environment	**53.33**	**42.22**	**44.44**	**17.77**	**31.11**	**11.11**
C1. Physical work environment	59.25	51.85	55.55	22.22	40.74	11.11
C2. Psychological working conditions	33.33	22.22	22.22	11.11	11.11	11.11
C3. Hazard analysis procedures	55.55	33.33	33.33	11.11	22.22	11.11
D. Follow-up	**22.22**	**11.11**	**11.11**	**0**	**0**	**0**
D1. Occupational accidents and illnesses	44.44	22.22	22.22	0	0	0
D2. Work ability of the employees	0	0	0	0	0	0
D3. Social work environment	0	0	0	0	0	0
Total	**53.93**	**42.42**	**42.42**	**12.12**	**18.18**	**9.69**

Fig. 1. Activity rates of the main elements of OHSAS 18001 in the certified companies.
Note: The sub-elements of OHSAS 18001 specified with numbers in Table 3.

documents, control of records, and internal auditing (Fig. 2).

The certified companies had considerably conducted hazard identification and risk assessment for recognition of unsafe conditions, but they had only slightly considered the behavior of employees in their workstations during such identifications. They did not identify the hazards associated with changes in the organization, its activities, or materials and the hazards associated with the design of work areas, processes, installations, machinery, and equipment. The presence of physical safety hazards such as improperly safeguarded machines, unsafe holes and obstacles in the surfaces showed that they had not suitably controlled such hazards. The companies had documented a large number of procedures and instructions based on the requirements of the OHSAS 18001 standard; however, there were shortcomings in their implementation and maintenance. The procedures and instructions were needed
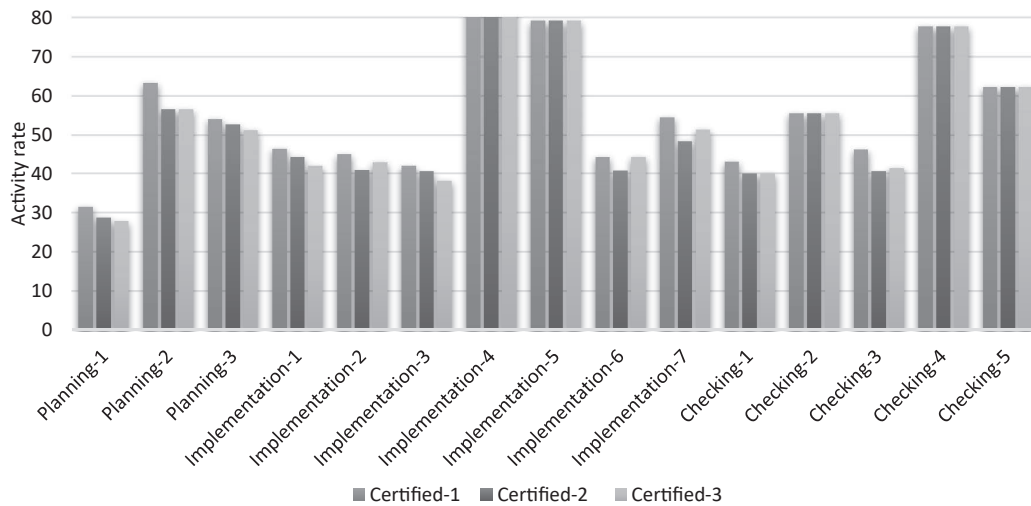
Fig. 2. Activity rates of the Sub-elements of OHSAS 18001 in the certified companies.

new revisions to perform job activities safely. Table 3 presented the shortcomings identified based on the collected evidence.

This study also identified gaps between actual practices and the existing documented procedures and OHS instructions. The certified companies documented good procedures, but they had improperly implemented and maintained the requirements of the procedures. For instance, the procedure of hazard identification, risk assessment and their controls in the companies required the identification of hazards and the assessment of the risks of all routine and non-routine activities. However, the companies did not conduct such identification for all non-routine job activities. There was also a lack of instructions for performing job activities in a safe manner. For example, two of the certified companies did not use a permit to work system for conducting high risk job activities, and one of them only applied hot and cold work permits for all high risk jobs. Further, employees performed their job activities using their traditional methods not as exactly based on the provided instructions to control of operations.

In-depth analysis of evidence gathered through the assessment of documents, site visits, and interviews indicated that the certified companies had problems in the implementation and the maintenance of the management system. The problems were related to management commitment to safety (items 1-2, 1-3, 3-1-1, and 3-1-2); managers and employees involvement in OHSAS 18001 practices (items 2-2-1, 3-3-1, and 3-3-2); safety communication (items 3-3-5 and 3-3-7); safety training (items 1-5, 3-1-3, 3-2-1, 3-2-3, 3-2-5, 3-2-6, 3-2-8, 3-3-8, and 4-3-2); incident/accident reporting, investigation and analysis (items

4-1-2, 4-3-1, and 4-3-3); audits and reviews (items 4-5-2, 5-2, and 5-3); policies and procedures (items 2-1-4, 2-3-2, 2-3-4, 3-6-1, 3-6-2, and 4-4-1); consultation about OHS issues (items 3-3-5, 3-3-6), and work plannings (items 2-1-3, 3-6-6, and 3-7-2). As presented in Table 3, these shortcomings were aspects of safety culture and indicated the presence of a poor safety culture in the companies.

Discussion

The present study identified shortcomings in the fulfillment of the requirements of the OHSAS 18001 standard in the certified companies. Although the certified companies had a better OHS practices in all elements of MISHA compared with the non-certified companies, the assessment of the activity rates indicated that there were gaps between the existing status of the management systems and the requirements of the OHSAS 18001 standard in all certified companies. The certified companies prepared a large number of documents that were required by the OHSAS 18001 standard; however, they had improperly implemented and maintained the requirements of the documents. This study also revealed that the certified companies had shortcomings in the components of safety culture.

The current study found that the certified companies had a higher OHS activity rates than the non-certified companies. The comparison of this finding with that found by Kussisto[46] in a Finnish metal manufacturing company revealed that total activity rates for the Finish case was lower (M=39.2) than the rates for the certified companies (M=46.25), but it was higher than the rates for the non-certified companies (M=13.33). Detailed assessment

Table 3. The results of safety assessments and Identified evidence for poor safety culture in the certified companies

The main and sub-elements of OHSAS 18001	Result of assessment
1) OHS Policy	1-1) The existence of written OHS policy in all companies 1-2) Failure of top management to give priority to OHS 1-3) Lack of practical commitment of top management to safety 1-4) Daily exposure of workers with unsafe conditions in the workplaces such as unsafe machines, noise, chemicals 1-5) Lack of awareness among most of interviewed workers of their individual OHS obligations in the policy
2) Planning	
2-1) Hazard identification, risk assessment and determining controls	2-1-1) Conducting hazard identification and risk assessment by involvement of one or two persons from each department and the safety officer in all companies. 2-1-2) The employing of a semi-quantitative method for risk assessment by all companies. 2-1-3) Lack of identification of hazards for the activities of personnel, such as visitors and subcontractors; the hazards originating outside the workplace; the hazards associated with changes or proposed changes in the organization, its activities, or materials; modifications to the OHSMS; the hazards associated with the design of work areas, processes, installations, machinery, and equipment. 2-1-4) Paying less attention to human behavior and capabilities as well as identification and control of health risks 2-1-5) The control of high risk hazards conducted mostly using safeguards for unsafe conditions of machines and personal protective equipment in all companies.
2-2) Legal and other requirements	2-2-1) The identification of the applicable OHS legal and other requirements and provision of them in all companies. 2-2-2)Taking into account some occupational health hazards by the applicable OHS legal and other requirements.
2-3) Objectives and program(s)	2-3-1) The existence of annually documented OHS objectives in all companies. 2-3-2) Lack of consistency between OHS objectives and OHS policy. 2-3-3) Consideration of OHS legal and other requirements only for occupational health hazards. 2-3-4) Lack of conducting OHS programs based on designated characteristics.
3) Implementation and operation	
3-1) Resources, roles, responsibility, accountability and authority	3-1-1) Lack of financial support of top management for finishing OHS improving projects. 3-1-2) Lack of visibly demonstration of managers' commitment to continual improvement of OHS. 3-1-3) Lack of information of interviewed workers about their OHS responsibilities and top management appointee in OHSAS 18001.
3-2) Competence, training and awareness	3-2-1) Lack of safety training for the interviewed workers. 3-2-2) Providing OHSAS 18001 familiarization courses only for their managers during the time of implementation of the requirements of the standard by all companies. 3-2-3) Recieving only training about the general topics such as fire safety but no training about their jobs' safety by some of the workers (they learnt only by doing). 3-2-4) Lack of education of the workers related to their jobs. 3-2-5) Lack of using result of hazard identification and associated risks to determine training needs. 3-2-6) Lack of effectiveness assessment for the provided general trainings. 3-2-7) Evaluation of the effectiveness of the training provided only by outside organizations using a questionnaire in all companies. 3-2-8) Lack of awareness of the workers who were interviewed regarding the OHS benefits of improved personal performance; their roles and responsibilities and importance in achieving conformity to the OHS policy and procedures and to the requirements of the OHS management system were also lacking.
3-3) Communication, participation and consultation	3-3-1) Lack of encouragement of employees to participate in OHS and OHSAS 18001 practices in all companies. 3-3-2) Lack of individual involvement of managers in OHS practices 3-3-3) The use of a top-down flow of information transmission in most cases. 3-3-4) The use of a suggestion box as a convenient way of communication of all interested parties. 3-3-5) Conducting safety activities such as risk assessment and incident investigation by safety department without participation and consultation of affected employees. 3-3-6) OHS policy and objectives documented during meetings in different departments of all companies without consultation with affected workers and as approved by top managers. 3-3-7) Lack of communication with the interviewed workers regarding OHS policy, their roles and responsibilities in OHSAS, the results of incident investigations, and the results of identified corrective and preventive actions. 3-3-8) Lack of awareness of interviewed workers about their commitment to the requirements of OHSAS 18001, even not knowing the implementation of OHSAS after at least 3 years of experience with a certified system.
3-4) Documentation	3-4-1) Providing a large number of documents required by the OHSAS 18001 standard in paper and electronic formats by all companies.
3-5) Control of documents	3-5-1) Controling all OHSAS documents based on the requirements of the standard.
3-6) Operational control	3-6-1) Implementation of control measures only for identified high risk hazards. 3-6-2) Lack of controls for the OHS issues related to purchased goods, equipment and services. 3-6-3) Documenting safety instructions for high risk operations by all companies. 3-6-4) Hanging safety signs in risky workstations by all companies. 3-6-5) Hanging brief safety instructions close to the workstations of the high risk operations by two of the companies. 3-6-6) Use of work permits for highly risk operations in one of the companies.
3-7) Emergency preparedness and response	3-7-1) Identification of potential emergency situations by all companies 3-7-2) Rarely testing preparedness and response for the identified emergency situations such as evacuation by the companies.

Table 3. Continued

4) Checking and corrective action	
4-1) Performance measurement and monitoring	4-1-1) Lack of monitoring for the effectiveness of controls by the companies. 4-1-2)The only use of accident statistics and rates to reactively measure the overall safety performance by all companies. 4-1-3) The measurement of noise, illumination, and some chemicals annually using calibrated equipment by all companies.
4-2) Evaluation of compliance	4-2-1) Evaluation of compliance with some of OHS legal and other requirements using checklists by all companies.
4-3) Incident investigation, non-conformity, corrective action and preventive action	4-3-1) Recording and investigation of only severe accidents by the companies' safety officers to discover the direct causes of them, but no effort was made to determine their indirect and root causes. 4-3-2) Lack of awareness of interviewed workers who experienced occupational accidents about their involved accident investigations. 4-3-3) Proposing corrective actions to control the direct causes of accidents nor root causes. 4-3-4) Identification of non-conformities during the internal and external audits. 4-3-5) Covering the actual OHSAS non-conformities that may have been identified during the external audits in the procedures not the potential ones.
4-4) Control of records	4-4-1) Establishment and maintaining records in a paper format to demonstrate their conformance with the requirements of the OHSAS18001 standard by all companies. 4-4-2) The existence of legible, identifiable and traceable OHSAS documents in all companies.
4-5) Internal audit	4-5-1) Conducting internal OHSAS audits based on audit programs by all companies. 4-5-2) Inadequate planned arrangements of the system in place for leading to a positive continual safety performance in all companies.
5) Management review	5-1) Reviewing the OHSMS by top managers of the companies. 5-2) Lack of presention of the real OHS situation in provided documents and information for management review meetings due to inappropriate and detailed assessment of risks without involvement of employees. 5-3) Lack of using proper indicators of safety performance. Such a lack could not lead to a real continual improvement.

of the activity rates indicated that the majority of differences between the certified companies and the Finnish case resulted from the implementation of the requirements of the OHSAS 18001 standard in creation of a good amount of documentation (structure) for the management of OHS.

The result of this study indicated that the certified companies had shortcommings in properly performing of OHSAS 18001 practices such as planning for hazard identification, risk assessment and control; incident/accident reporting, investigation, and analysis; safety training, and operational control. The properly conducting such practices are prerequisites for having a safe operation in a workplace. Whether these practices peformed poorly, the ability of an OHSMS to manage OHS and protect employees will be limited, and the management system may even degenerate into a "paper system"[47]. This situation can be considered as a reason for the existence of paper systems in the companies. Therefore, the revision of the practical procedures for conducting OHS/OHSAS 18001 practices of the companies is necessary to bring the requirements of the OHSAS 18001 into practice.

The findings of this study revealed that the certified companies established a large amount of documents; howere, they did not follow their documented procedures and instructions at least five years after the certification. This result match that observed in an earlier safety climate study, which found the highest scores for safety procedures in the companies[45]. The problematic gap between safety procedures and instructions with practices has been

highlighted previously in the safety literature[48, 49]. It can be inferred that the companies conducted a lower level of efforts in adequately implementation and maintenance of the requirements of the documents. Likewise, the insignificant difference between activity rates of the certified companies in OHSAS 18001 practices and the identical rates for documentation, control of documents and records indicating the existence of approximately similiar mechanical systems in the companies. The highest activity rates of documentation and lack of OHS/OHSAS 18001 practices are good indicators for the existence of inadequate OHSMSs in the companies. Frick[50] hypothesized such systems as "paper tiger" systems. Since a vital factor to transform of a documented or formal (mechanical) system to carry out in practice (operational system) in an organization is safety culture[5], the detailed analysis of collected data revealed shortcomings in the components of safety culture.

This study found evidence for existence of a poor safety culture in the certified companies. This finding is in aggrement with the result of a recent study, which showed a insignificant improvement of safety climate in the companies[45]. The comparison of the obtained evidence with descriptions of levels of safety culture for concrete and abstract organizational aspects in the study of Parker *et al.*[51] revealed that the companies overally had recative or calculative safety culture (see Table 3). The evidence also compared with the feautures of a good safety culture in an OHSMS-adopting company affirmed by Fernandez-Muniz *et al.*[9], and it is indicated that the companies had

inadequate OHSMS in place to improve safety culture. A possible explanation for these situations might be that the mechanical implementation of the requirements of the OHSAS 18001 standard and the lack of efforts for maintaining the requirements and improving safety culture in the companies.

The safety culture deficiencies in the certified companies have been identified as essential factors in developing an effective OHSMS for continuously improving safety performance[3]. The weak situations might result from the failure of the companies to properly implement and maintain essential arrangements and actions required by the OHSAS 18001 standard to develop a high-quality OHSMS. Since an effective OHSMS in an organization results from the combination of the mechanical implementation of the system and a positive safety culture[52] and the existence of safety culture deficiencies is an obstacle to the effectiveness of OHSAS 18001[53], the mechanical implementation of the requirements of the OHSAS 18001 standard is not enough to achieve a better OHS performance. The establishment of a positive safety culture is a primary objective of an OHSMS, which can identify and correct safety related problems prior to the occurrence of an accident[43]. Furthermore, an adequate level of safety culture is needed to support, improve, and effectively work of an OHSMS[7]. Therefore, the practical efforts of the companies to improve the safety culture are needed to achieve such performance. It can be inferred that the main aim of the companies by the implementation of the requirement of the OHSAS 18001 standard have not been the reduction of OHS risk to achieve a better OHS performance. Because obtaining such objectives requires more efforts to conform all requirements of the OHSAS 18001 standard and to improve the level of safety culture, while the current study showed opposite findings.

In this study, evidence such as lacking of OHS programs' support and failure to give priority to OHS were found as indicators for the lack of managent commitment to safety in the certified companies. This finding is consistenet with the results of an earlier study, which showed that the lack of management commitment to safety was a main barrier to the effectiveness of OHSAS 18001 in the companies[53]. The commitment of the senior manager of an OHSAS 18001-adopting company impacts the commitment of employees, and it is a crucial factor to create a positive safety culture and a successful OHSMS[14]. Such commitment should be demonstrated in the practices of the company. The existence of a poor safety culture and paper systems in the companies may particularly relate to lack of

commitment. The efforts to escalating commitment of the managers and employees can help to improve the safety culture and to make an effective system in the companies.

The results of this study showed that the OHS and OHSAS 18001 practices such as hazard identification, risk assessment, and accident analysis mostly performed by safety officers and a limited number of personnel. Since the culture defined as "the way things are done around here"[54], the OHS and OHSAS 18001 practices can consider as an important indicator of safety culture in an OHSAS 18001-adopting company. In addition, several reports have shown that the employee participation is a decisive factor in the success of OHSMSs and in the improvement of safety culture and safety performance[9, 55, 56]. Although the improvement of safety culture is a time-consuming task[57], the practices of the companies at least five years after the certification indicated that the lack of OHS/OHSAS 18001 practices existed to change and improve it. This finding apparently reveal that the companies did not conduct adequate level of efforts to implement/maintain the requirements of the OHSAS 18001 standard and to improve safety culture. Since the commitment of a senior manager of an OHSMS-adopting company impact the commitment of employess and enhance their safe behaviors[9], lack of OHS and OHSAS 18001 practices and the poor safety culture may result from inappropriate commitment of senior managers of the companies and a low-level of efforts to integrate the requirements of the OHSAS 18001 standard throughout the process and organizational frameworks.

Providing inadequate safety training for employees also found as another indicator of a poor safety culture in the companies. The finding is consistent to the outputs of prior studies[29, 53], which found lacking of safety training for managers and employees in manufacturing companies. The collected evidence (see Table 3) demonstrates that the safety training administered using inappropriate methods, and the companies provided it for a limited number of employees. Arrangment of a continous safety training is necessary to develop employee competence and skill, and it is highly relevant to employee safe behavior in an organization[9, 55]. Thus, lack of knowledge of the workers who were interviewed regarding the OHS/OHSAS 18001 may impact the participation of them in OHS/OHSAS 18001 practices. This finding also suggests that the system is mostly operated by the higher level personnel (i.e., white collar managers) and only slightly by the lower levels of the companies. Likewise, OHSAS 18001 is a social system and the knowledge of employees and their commitment to perform the requirements of it in practice affect the

success of the system in a certified company[12]. Providing high-quality safety training can improve employees' safety knowledge, skills, and abilities to make a successful system in the companies.

The application of combined quantitative and qualitative approaches for analyzing the findings provides enough information to identify the shortcomings of the management systems. The assessment of the practices conducted by the companies identified the main shortcomings in the implementation and maintenance of the certified management systems. The quantitative assessment showed a gap with the requirements of the OHSAS 18001 standard needed by the certified companies to improve their practices in all criteria of the OHSAS 18001 standard. In addition, the application of a ranking method provides a structure to better assessment of the quality of the management systems through having a four-point response, the ongoing situation of OHSAS 18001 and OHS practices, and the easy comparison of the results among the companies. While the existence of a little evidence for an element resulted to use a complete score in the yes/no procedure. Furthermore, the application of triangulation in collecting the required data helped to find evidence for the existence of shortcomings in the safety culture not only on paper but also in practice.

Conclusions

The main findings from this study were that the certified companies had better activity rates for OHS practices compared with the non-certified companies. The certified systems have not developed in a proper manner, and there were shortcomings in the fulfillment of the requirements of the OHSAS 18001 standard in the companies. The companies established a large number of documents that not followed by employees. The in-depth analysis of the collected evidence such as lack of financial support of OHS projects and inadequate safety training indicated the presence of safety culture deficiencies within the certified companies.

The findings of the present study well demonstrated that the sole existence of required documents by the OHSAS 18001 standard cannot guarantee the fulfillment of the requirements of the standard, the existence of a high-quality system, and adequately conduct the OHS/OHSAS 18001 practices in the certified companies. In addition, the current study highlight the importance of safety culture in the enhancement of OHS and OHSAS 18001 practices in the certified companies. This study suggests that the certified companies should focus on the continual improvement

and proper maintenance of the implemented management systems through practically escalating their commitment to proper implement and maintenance of the requirements of the established systems. The companies should also conduct safety training for their employees, communicate and consultate with the employees about OHS issues in their workstations, and involve them in daily OHSAS and OHS practices. Such efforts may help the companies to perform the OHS and OHSAS 18001 practices on a daily basis, to enhance the level of safety culture, to continously improve the quality of the management systems, and to achieve a satisfactory OHS performance.

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