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Research Article

The Importance of Workplace- Occupational Safety in the Perspective of Enterprise Sustainable Development and Performance

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Abstract

Workplace- Occupational health and safety has grown more vital in order to safeguard the sustainability of firms' manufacturing operations in order to adapt to competitive pressures circumstances and quick consumption. Recognizing the destruction of productivity and image, as well as the money and spiritual expenses due to workplace fatalities and occupational diseases, implementing measures and improving workplace health and protection would bring major benefits to individuals, businesses, and the country 's business. Unsafe conditions, depending to studies, may be influenced through variables such as physical and technological environmental circumstances, as well as personnel characteristics. Conditions including the framework of the technology and manufacturing industry, the specifics of mining, development, and transportation lines of enterprise, ignorant and underqualified manufacturing workers, incapacity to adjust to technological advancements, environmental degradation, production organization layout, and the failure to use individual protective equipment and equipment guardians could all lead to occupational fatalities, particularly in underdeveloped and emerging nations.. These circumstances are significant in the likelihood of workplace accidents. Throughout the scope of this research, investigation is performed on the workspace functioning system, ergonomically design, and occupational physiological variables, which are considered the drivers of occupational disasters in generally. A continuous improvement, total abilities and accomplishment (5S and Total Productive Maintenance) Implementation is provided to enhance occupational security and functional productivity in a business that manufactures white appliances. As a consequence of the specific application, an assessment was carried out in the perspective of worker productivity and commercial performance of the operations.

Keywords: Enterprise Performance-Efficiency, Workplace-Occupational Safety, Sustainable Development.

Kurumsal Sürdürülebilir Gelişim ve Performans Açısından İşyeri-İş Güvenliğinin Önemi

Öz

Artan rekabet şartlarında ve tüketime hızlı yanıt verebilmek ve işletmelerin üretim süreçlerinin sürdürülebilirliğini sağlamak için iş sağlığı ve güvenliğinin önemi artmıştır. İş kazaları ve meslek hastalıklarının sebep olduğu verimlilik ve işletmelerin vizyon kayıplarının yanı sıra maddi ve manevi kayıpları, olumsuzlukları da dikkate alarak işyerlerinde sağlık ve güvenlik alanında önlem almak ve iyileştirmeler, geliştirmeler yapmak çalışanlara, işverenlere ve ülke ekonomisine önemli kazanımlar sağlayacaktır. Yapılan araştırmalara göre iş kazaları, çalışanlarla ilgili sebeplerin yanı sıra fiziksel ve mekanik çevre koşullarına bağlı faktörlerden de kaynaklanabilmektedir. Özellikle az gelişmiş ve gelişmekte olan ülkelerde sanayi ve teknoloji endüstrisinin yapısı, inşaat, madencilik ve ulaşım sektörlerindeki iş yapısına ait özellikleri, eğitim almamış ve vasıfsız sanayi çalışanları, ileri teknolojiye uyum sağlamadaki eksiklikler, teknolojiye adapte olamama, çevre kirliliği, üretim organizasyon yapısı gibi durumlar, kişisel koruyucu ekipman ve makine koruyucu kullanmamak iş kazalarına neden olabilir. Bu durumlar iş kazalarının meydana gelmesinde önemli yere sahiptir. Çalışma kapsamında genel anlamda iş kazalarının nedenleri arasında yer alan işletme çalışma saatlerine yönelik sistemi, ergonomik koşulları içeren yapı ve işletme, çalışma ortamına ait fiziksel koşulları ve faktörleri hakkında araştırma yapılmıştır. Beyaz Eşya Sektöründe üretici

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olan bir işletmede iş güvenliğini ve operasyonel verimliliği sağlamak için 5S ve Toplam üretken bakım uygulama örneği sunulmuştur. Uygulama sonucunda işletmede iş ve işletme verimliliği yönünde bir değerlendirme yapılmıştır.

Anahtar Kelimeler: Kurumsal Performans-Verimlilik, İşyeri-İş Güvenliği, Sürdürülebilir Kalkınma**.**

1. Introduction

Sustainability is an expression that encompasses the concepts of three components: profit-financial, environment and social sides; nevertheless, the vast majority of companies and research scientists are primarily concerned with the first two issues: financial (in other words life cycle cost evaluation, cost benefit assessment, and etc.) and energy-related concerns (such as energy consumption, emissions reductions, recycling, and so forth). Although sustainability seeks to strike an equilibrium between economic development, socioeconomic evolution, and environmental protection, its implementation is difficult to grasp. Generally, environmental organizations are considered accountable for addressing concerns of sustainable development which might result in, or be seen as, a deficit in the economic and social dimensions. This study contends that by recognizing the relationship between sustainability and safety, the conceptualization of sustainability might well be better comprehended (Nawaz et al., 2019; Pinto, 2014).

Relationship between safety and sustainability is recognized by industry and specialists, it is frequently overlooked at the operating and conceptual levels. The inadequacy of a safety practices is the key cause for neglecting this essential link. Internationally, the safety culture in cultures and businesses has not progressed to meet aspirations; safety has still been regarded as a responsibility until an accident happens. The safety cultural heritage is especially significant in organizational contexts because it encourages risk-based understanding at all stages, which aids in seizing advancement opportunities via risk management and minimization. The current research demonstrates that a leadership styles and organizational training program focused on transformative management and enhanced the safety atmosphere and sustained productivity. This adds to the evidence that leadership training is an effective occupational health and safety strategy. The outcomes are consistent, regardless of whether the administrators choose to improve safety, productivity, or overall leadership qualities. The finding of maintained productivity suggests that safety might well be enhanced without reducing production and might even be connected to leaders' better capacity to avoid unexpected implications for one performance element, namely productivity, while concentrating on the other, namely safety. Eliminating the hazards at the top of the accident prevention strategy and, if not, reducing the risks by using different methods are the top headings of the headings, and their fulfillment can be achieved at the design stage. Design and construction techniques that involve less risk of occupational accidents are a dimension of the job. The other dimension of the design is that the design is suitable for the establishment and placement of occupational safety systems, which are lower in the accident prevention hierarchy (Mohandes and Zhang, 2021; Pinto, 2014).

The established model in this study provides safety experts and researchers with an encompassing and exact comprehensive rating system of the safety hazards that emerge on construction sites in special methods. Regarding the first time, the safety decisions makers participating in the evaluation phase are allocated accurate relevance weights depending on their backgrounds, so addressing flaws in the traditional practice of construction safety evaluation (where there is no differentiation between safety decision - making with varying levels of expertise). The inclusion of this critical matter leads in significantly diverse rankings of detected safety hazards. Furthermore, the concerned safety specialists are presented with a highly complete final ranking scheme in an active arena, taking into account all of the critical elements influencing constructing worker safety (Jilcha and Kitaw, 2017; Pinto, 2014)

Lacking development fundamentals, sustainable improvement cannot be considered. Previous studies identified these components as the economy, the social, and the environment. When these cornerstones are improved, sustainable improvement emerges reliable in terms of workplace safety and health enhancement. This research focuses on the connection between workplace sustainability and technological development. Another conclusion in this research indicates that workplace safety and health development leads to sustainable growth via healthy individuals, safer workplaces, lower accident costs, a regulated environment, controllable workplace accidents, and increased workplace safety understanding. The scholars have also sought to pave the way for sustainable development via approaches to workplace safety and health innovation and quality. This research was performed out utilizing a desk review technique, with data sources drawn from worldwide publications on occupational safety, occupational health, innovation, and sustainable progress, as well as the relationship between workplace safety, health, the environment, and sustainable improvement (Torrecilla-García et al., 2021; Jilcha and Kitaw, 2017).

The research of Torrecilla-García et al.(2021) attempt to evaluate RDI (Research Development and Innovation) on workplace health and safety in Spain. A Delphi study was undertaken with eight professionals in study and occupational health and safety to attain this goal. The conclusion has been that, when compared to comparable regions such as the environment and quality, there was insufficient encouragement and assistance for RDI in occupational health and safety, and that it should become a scientific primary concern to encourage new programs which increase and fund innovation activities in this location. According to the findings, the number of these initiatives is fewer than in other categories, such as the environment and quality. Furthermore, occupational health and safety initiatives receive less financing than other programs in the abovementioned sectors (Torrecilla-García et al., 2021).

In this research, the observations encourage discussion and possess the potential to spark new lines of inquiry in the future. This research does have some restrictions. The empirical analysis evaluated occupational health and safety programs to other domains that are reasonably similar. Although sustainability seeks to strike an equilibrium between economic development, socioeconomic evolution, and environmental protection, its implementation is difficult to grasp. Generally, environmental organizations are considered accountable for addressing concerns of sustainable development which might result in, or be seen as, a deficit in the economic and social dimensions. This study

contends that by recognizing the relationship between sustainability and safety, the conceptualization of sustainability might well be better comprehended.

2. Literature review

2.1. Literature review for Sustainability of Occupational Safety

The viewpoint places occupational health at the heart of sustainable development (Molamohamadi and Ismail, 2014:198-202). WHO (2012;1994) highlighted safe workplaces and healthy employees as necessary for productivity as well as social, economic, and environmental sustainability. According to Amponsah-Tawiah (2013), the most productive and economically, socially, and ecologically beneficial firms are those with the best workplace safety and health policies. Due to BHPbilliton (2005), sustainable advancement is an essential component of workplace safety, health, the environment, and society, and it strives to drive continuous performance development.

Design for Occupational Safety or Occupational Safety by Design should be understood to mean ensuring the safety of construction workers through the design of the permanent features of any structure or project. It also indirectly affects the reduction of the total project cost, indemnities arising from work accidents, delays and project duration extensions caused by work accidents. In addition to all these, benefits such as ensuring or strengthening work safety during the operation phase of the project and during maintenance should be counted (Szymberski, 1997).

The only direct cause of occupational accidents and diseases may not be only undesirable working conditions and conditions, negative working conditions that are suitable for the cultural and social structure of the employee may also be one of the important causes of decreases in the quality and quantity of production, decreases in the level of work safety, excessive labor turnover and absenteeism. . Ultimately, the consequences of such situations will vary depending on sociocultural factors. For example, the so-called social labor cost, which is emphasized nowadays in developed countries and is sometimes the subject of acts of violence is not very common in other countries. It is a fact that in a place where there is a demand for labor, an enterprise that does not improve its working conditions in line with technical and economic progress cannot maintain a stable workforce and achieve a profitable level of productivity (Rodriguez, 2018; Robson et al., 2012; European Agency for Safety and Health at Work, 2007).

Occupational Health and Safety (OHS) emerged after industrialization and gained importance in working life; To put it more accurately, it is stated as an area whose importance is being understood day by day. The main purpose of this field, which was born limited to the health and safety of the worker, but has been developing more and more today, is expressed as the preparation of a healthy and safe working environment in the workplace. Understanding and addressing health and safety issues that endanger employees in manufacturing processes is critical for an institution's survival and development. To effectively evaluate and estimate concerns, several approaches are employed. The recommended technique improves the following highlighted issues in this research. The degree of difficulty in determining the occurrence rating (O), severity rating (S), and detection rating (D) (D). Acquiring the identical Risk Priority Number (RPN) score with multiple O, S, and D configurations. RPN elements are repeated. Considering the RPN is a combination of categorical attributes, it is impossible to get a large number of transitional variables. The RPN scale's counterintuitive statistical assets (Mutlu and Altuntas, 2019).

2.2. Studies On the Relationship of Design and Occupational Safety

Most of the time, the security of any system (job security) is not a clear and specific initial purpose for the designer, and this purpose is delegated to the occupational safety experts. However, especially if industrial production is mentioned, contrary to reactive occupational safety (taking measures against a critical event after it has occurred), proactive occupational safety approach requires foreseeing many issues related to any critical event. For this, joint studies, analyzes and forward-looking options need to be brought together. In summary, a proactive occupational safety approach in design should consider three basic issues (Gambatese et al., 2008; Behm, 2005; Gambatese and Hinze, 1999)

- Different design stages and levels (customer, engineer, needs analysis, specifications, etc.)

- Different management levels in the company (general management, decision centers, local supervisors, implementation level)

- Different risk levels (operator occupational safety and health risk, socio-technical

Developers- Designers have a direct impact on constructing worker safety. The design determines how a program would seem and how a specific program or its components would be built. Assembling procedures are frequently overlooked as being imposed by the designers. In actuality, designers have a large effect on how building jobs are carried out. Regrettably, developers have been unaware of their impact, and as a profession, they have not recognized the significance or relevance of their position in safety. Some developers have indicated that they purposely ignore addressing construction safety in order to decrease their potential risk. When asked about their effect on safety, designers frequently note a lack of skills and training to address constructing worker safety. While they acknowledge that their designs have an influence on safety performance, they claim they do not know how to adapt their designs to enhance or assure safety. This highlights the necessity for developers to have access to a centralized body of knowledge in order to consider safety in their projects (Behm, 2005; Weinstein et al., 2005).

Industrial sanitation measures are similar to the measures taken to prevent accidents. It is a subject that requires both medical and technical knowledge. This is a risk related to interdisciplinary activities and ergonomics cannot be excluded from this rule. For this reason, it is very important for the business management to understand the problems and apply the most appropriate approaches to the solution. It should be determined in accordance with the special situations of employers and employees (Rabinowitz and Hager, 2000; Robson et al., 2012; Judith, 2013).

A few main basic principles can be established for industrial health. The most effective preventive way, above all, is the measures to be taken during the design phase of the building, factory or work process, as seen in mechanical safety. Because the developments and corrections to be made later will be very expensive, and there may be some late measures in terms of protecting the health of the workers. Hazardous processes (processes that pollute the environment, make noise and vibration) and harmful substances that pollute the workplace air should be replaced with harmless or less harmful substances. In the event that group technical methods and managerial methods fail to reduce exposure to an acceptable level, workers should be provided with appropriate protective tools. These properties of the tool- workplace physical factors are defined as below (Judith, 2013; Li and Guldenmund, 2018; Robson et al., 2012; Hasle et al., 2012; Frijters and Swuste, 2008; Hasle and Limborg, 2006; Rabinowitz and Hager, 2000; Everly, 1986).

Workplace Physical Factors -Noise: Psychological effects of noise; behavioral disorders, anger, general discomfort, boredom, physical effects; temporary or permanent hearing damage, physiological effects; Changes in body activity, increase in blood pressure, circulatory disorders, acceleration in breathing, acceleration in heartbeat, sudden reflexes, performance effects are seen in the form of decrease in work efficiency, concentration disorder, and inhibition of movements. According to the researches, the noises originating from the workplaces affect the hearing health and perception of people negatively, disrupt the physiological and psychological balance, decrease the work efficiency and increase the work accidents

Heat and Humidity: Working environments with high temperatures cause distress and discomfort to people. Having the working environment at the appropriate temperature level, in other words, hot and cold working conditions suitable for the job, the environment and the season increase the productivity of the employees and reduce the work accidents.

Lighting: Employees in workplaces with adequate lighting can see better than those who work in poorly lit workplaces, and accordingly they get tired later. If the lighting in the working places is less than necessary, eye and body fatigue occurs quickly in the employees. This increases the likelihood of people having an accident.

Ventilation and Dusts: The air of the workplaces with closed working areas is polluted due to the sweating and respiration of the workers and the gases, vapors and dusts that arise due to the machines used in the workplace. Air pollution in the working environment causes workers to not be able to breathe enough oxygen. This causes the workers to get tired in a short time and their behavior to deteriorate. In addition, the polluted air resulting from inadequate ventilation in the workplace negatively affects the sensitivities of the employees and results in them not showing the necessary interest and attention to their work.

Emergency Measures: At the workplaces, alarm and evacuation trials should be carried out once a year, these trials will be carried out under the supervision of a team consisting of an authorized and experienced supervisor, workplace guards and a sufficient number of assistants, and will be organized in accordance with the workplace fire plan. Determination of emergency assembly places, necessary warning signs should be placed in emergency assembly areas. Environmental measurements such as Noise-Dust-Lighting should be made by authorized institutions-organizations the necessary measurement of the environment should be made, the personal exposure value should be determined, and necessary measures should be taken as a result of the determination. The fire extinguishing drill must be requested from the authorized fire extinguishing company and the provincial disaster directorate, all personnel must be trained in this regard. First aid and medical supplies in accordance with the legislation must be supplied by the employer.

Vibration: High-frequency vibrations affect both the physiological health and mental activities of the employee. The continuity of the vibration in the working environment makes the employees tired and nervous. Fatigue and irritability and physiological health problems in people exposed to vibration predispose people to exposure to accidents.

Machine Selection and Machine Protectors: The operator using the machine may be injured or even cause fatal accidents due to the accidental contact of other people in this area or the operator with moving parts while operating or working on the machine.

In generally, it may be stated that an occupational safety program is a tool that provides for the ongoing harmonization of occupational health and safety operations and company plans, and therefore could be used to continuously develop and resolve operations (Çakıroğlu, 2007; Gallagher et al., 2001). The followings are the purposes of the management and execution of the national and international occupational health and safety management systems (International Organization for Standardization, 2009): a) Sustainable improvement in occupational health and safety performance; b) compliance with legislation and other standards; and c) achievement of occupational health and safety standards.

Frijiters and Swuste (2008) investigated whether occupational safety risks change according to flooring types and compared wide flooring and hollow beam flooring methods. In this study, only fall and stumbling type accidents were examined and only floor construction and its sub-items were considered as work items. It has also been shown by the case study that the risks of fall-type work accidents are taken into consideration and the design alternatives are chosen accordingly, at the design stage, and it is underlined that hollow-beam flooring should be preferred.

2.3. Occupational Safety in the Working Environment

Unsafe situations arise at many stages from the technology used in production to machinery and workbenches, from various tools and devices to hand tools and auxiliary equipment, from workplace layout and storage to maintenance and controls, and as a result, occupational accidents occur. It consists of insecure behaviors of working people and insecure situations in the workplace. During the production process, which has a variable nature, management and control deficiencies and the insufficient awareness of occupational safety in workers and employers are secondary indirect causes of occupational accidents. It is not possible to prevent occupational accidents without eliminating these causes. To be able to work in a healthy, safe and efficient way in the workplace; It is possible by arranging workplaces and necessary equipment, factors such as sound, lighting, ambient

temperature, work organization and management systems in accordance with the structural, dimensional and psychological characteristics of the employees. Deciding on the location of factories and workshops is a strategically very important issue. Due to incorrect placements, costs such as time losses, work accidents, and productivity reductions arise. While things go more smoothly and smoothly in facilities with the correct layout, even those who work at the facilities with the wrong layout are dissatisfied. Planning the factory with the right location in the factory will provide important added values both economically and sociologically, and will contribute to the efficiency of the work done from the beginning and will provide returns to the workplace (Li and Guldenmund, 2018; Frijiters and Swuste, 2008; King et al., 2005; Gallagher et al., 2001).

One of the reasons for the occurrence of accidents in the enterprises is the incompatibility of the employees with the machine they are working with. Although there are various reasons for employee-machine mismatch; Studies have shown that the physiological characteristics of the employees and their attitudes and behaviors due to psychological reasons have an important role in the worker-machine mismatch.

Work-related musculo - skeletal diseases (WMSDs) are arguably the greatest expensive medical problems confronting culture today. Preventative necessitates expenditures, and firms must do a cost-benefit analysis of ergonomic initiatives. Return on treatment is a new topic in workplace safety and health (OSH). Several investigations have been conducted on the return on investment in WMSD treatment in terms of the advantages to the enterprise in which the protective measures are applied. Nevertheless, it is equally necessary to assess the impact of any intervention on community (externalities). A technique for doing a fiscal and operational cost assessment on OSH programs was created and tested in the context of WMSD treatment in a Portuguese hospital. Six of the hospital's departments have had their incidents and associated expenses examined. A financial and economic cost-benefit assessment was conducted, and the benefit cost proportion (B/C) was computed (Ramos, 2017: 14-25).

According to Hudson (2000), safety management has evolved from a non - systematic but well series of operations and norms to a systematic technique of improving outcomes. Nevertheless, this is still unclear how development processes are supported and if accreditation of health and safety management promotes a firm's quality initiatives (Rocha, 2010; Robson et al., 2007; King et al., 2005). Public health regulations and approaches to optimize occupational health and safety (OHS) in small companies should be developed with their functional, economic, and productive characteristics in mind, and should address the need for governmental, managerial, and congressional generalization on the one hand, while increasing public holdings and financial forces on the other. It is proposed that external advising and intermediary assistance measures be strengthened in order to promote understanding about and access to state funds. Efforts should be made to influence companies' attitudes toward occupational safety and to strengthen the culture of safety (Ramos et al., 2017; Bonafede et al., 2016; Haslam et al., 2016).

Small businesses are more vulnerable to occupational threats than bigger businesses, and they often have less resources to handle the risks. Developing efficient methods to enhance the workplace environment is thus a big task for regulations and other participants. The purpose of this work is to create a systematic strategy for designing personalized intervention programs to fit the needs of small businesses. The notion of realism assessment could give insight into methods for transferring intervening knowledge from one environment to another. This conceptual technique is used to create a design model. The framework is an effective framework for a methodical design approach. The approach clarifies for both academics and operators how current information could be utilized to build new management programs (Bonafede et al., 2016; Haslam et al., 2016).

Emergency stop buttons on machinery and equipment of the production facility; In accordance with the Occupational Health and Safety (OHS) regulation, and other existing legislation and standards in our country, there should be emergency stop buttons on all machinery and equipment that can be used in an emergency and are easily visible to employees (Bonafede et al., 2016; Haslam et al., 2016).

Safety Sensors Available on Machinery; The safety sensors of the machines applied by the authorized personnel should be checked periodically. The employer should constantly warn that these sensors should never be canceled by the employees (Bonafede et al., 2016; Haslam et al., 2016).

Electrical Installation, Lighting, Internal Installation Failure/Accident Precautions; Main panel casings, electrical machinery equipment and sockets in common areas must be grounded if the grounding is missing, and the measurements must be repeated annually in accordance with the legislation, panel covers are locked and insulating mats with appropriate cross-section should be supplied under each electrical panel. It is necessary to have maintenance and inspections carried out by effective institutions/organizations/individuals once a year in accordance with the legislation programs (Bonafede et al., 2016; Haslam et al., 2016).

Descriptions, dimensions, etc. of all components used by the manufacturer. Where additional explanation is required, perspective or schematic pictures and spare parts lists should be specified in the user manual and part codes should be defined. Manufacturer's name, address, machine model, model year information should be indicated on the asphalt plant in an easily visible way directly or through an identification plate. Units of the plant Moving or rotating parts on it must be protected in a way to ensure the safe operation of personnel. A sufficient level of operator training should be provided to the personnel who will use the asphalt plant. The safety atmosphere of a company is defined through how administrators combine the relative significance of safety and production. This provides executives a prominent role in organizational safety, and it implies that leadership training might increase safety (Von Thiele Schwarz et al., 2016; Hasle et al., 2012; Hasle and Limborg, 2006).

3. Application Areas in the Industry-Application Examples

In many countries, it is necessary to determine that a newly established industrial structure fully complies with the existing standards. When it comes to the layout of the workplace, attention is more focused on measures to isolate processes that are uncomfortable and dangerous. In addition, a free space of not less

than 2 square meters should be provided to each worker in order to prevent accidents. Walls and ceilings should be covered in a way to prevent contamination and humidity and, if necessary, to reduce noise transmission (Gürlesel, 2007; Güray, 2003; opinion of the author). 5S Application plays an important role in providing Occupational Health and Safety for the sector.

3.1. Sectoral Applications

In this part , the 5S application due to Occupational Safety of 2 different companies that are examined within the scope of Business Efficiency and Sustainability applications. The purpose of total productive maintenance (TPM) is to improve the use of equipment and workers, to make production efficient within the enterprise. TPM basically starts with the 5S cleaning and ordering process. The purpose of 5S is to organize the working environment in the enterprise and to reduce waste to zero, and it is a process at the center of TPM studies. (Elvan, 2012)

Implementation of 5S and TPM Activities in (TA) Engine Overhaul Workshop of Turkish Airlines: The engine overhaul workshop within the body of TA carries out the necessary operations within the company and in the modification and revision processes of the aircraft engines of its customers. In this context, the operations are planned together with the engineers and the maintenance operations are carried out. The maintenance operations are primarily planned together with the motor disassembly operations. After the dismantled motors are replaced by the pedals for dismantling, the motor disassembly operations are started. In this section, the employees are responsible for disassembling the engine parts, cleaning the parts inside the engine, and making the relevant fault finding. After the parts that need to be repaired go to the repair shops, the parts returned from the repair are sent to the planning department to be mounted on the engines. At these stages, the parts are transported in the dismantling vehicles so that the parts in the engine are not mixed and organized (Elvan, 2012).

*Reasons for Starting "5S" TPM Activities in the Workshop :*The aim of the business is to increase the efficiency of the company, to reduce the costs in the maintenance process with the right direction of the company resources and the employees to work more efficiently with less workforce. In this sense, after seeing the output in all these studies, the TPM steps applied as a result of the efficiency of these processes are now planned to be standard. With this study, the company planned to reduce its costs by 50% with low cost and high output (Elvan, 2012).

Implementation of "5S" Activities in Engine Overhaul Workshop: TA aims at high efficiency with zero error and planned operations with the TPM application in this workshop, under the following headings (Elvan, 2012).

(i) Safety: Having an orderly, clean working environment in the business is considered important in terms of taking precautions against possible injuries. In this context, the 5S application has enabled the company to take precautions against processes such as falling and fire, which may be caused by scattered tools. Employees are enabled to take precautions against potential dangers that may occur with warning letters that they can see visually. Thanks to the well-planned organizational structure, there are no pieces of equipment around, as the equipment is properly placed and the areas where they will put the equipment after work are properly determined. In this process, accidents have been reduced to a minimum, especially since the chemical substances are properly stored and their locations are clear after use.

(ii) Efficiency and Production Flow: With the TPM system, the necessary and unnecessary equipment was classified first, and with this classification structure, the confusion and stress situation that could occur during the equipment search process of the workers was eliminated and productivity increased by considering steps such as the frequency of use and proximity to the machines. With the indicators showing the location of the equipment, the employees know where to find the equipment they want, even if they do not know the location of the equipment at all. The cleaning and control of the equipment has also prevented the loss of time that may arise unplanned.

(iii) Increased Quality: The cleaning and maintenance control processes carried out on a daily basis have given the company the opportunity to discover and regulate its damages in advance and to prevent further damages early. In this way, if a problem is observed while cleaning the machines or equipment or performing daily checks, immediate intervention is made, thus eliminating minor problems and preventing the occurrence of medium and large-scale problems in the future. These previously blocked processes help the company to get rid of the company at a lower cost, since it is repaired in advance of the cost damage that may occur after the loss of time or equipment failure.

(iv) Dominating the Entire Enterprise: In the studies carried out with the guidance of the personnel working in the enterprise, the following steps were taken to increase the efficiency (Elvan, 2012; Genç, 2007);

• Unnecessary tools have been removed from the work area and classified as generally used equipment and unused equipment.

• Steps such as where the equipment will stand and which equipment should be next to which machine have been determined.

• By assigning numbers to the classified and regulated equipment, it was determined where the personnel should put the equipment after using it and where they could find the equipment when they were looking for it. Thus, both time and cost loss are reduced.

3.2. 5S Strategy-Implementation

5S is a very simple and central method of simplification / restructuring that consists of five steps, the purpose of which is to help organize the work environment and eliminate waste. The objective is to ensure that the environment you live and work in is clean, tidy, healthy and safe, and to maintain these conditions. 5S, as you can guess, consists of 5 steps, the original is expressed in 5 words in Japanese. 5S is generally of the initial techniques which may be used in a firm that is establishing a strategy of continuing development. A 5S application assists in defining the basic guidelines for waste elimination and maintaining an efficient, safe, and clean working atmosphere. Taiichi Ohno, who invented the Production Process, and Shigeo Shingo, who not only proposed the poka-yoke conception, promoted it extensively. The principle of 5S is typically stated as a location for everything

and everybody in its position. Sort, Straighten, Shine, Standardize, and Sustain are the five steps in the 5S process for building a more structured and productive workstation. 5S lays the groundwork for implementing more sophisticated lean manufacturing technologies and procedures (Implementing 5S Methodology, 2022; Earn The Art & Science Of Manufacturing Improvement From Vorne, 2022; What is 5S?, 2022; Bozkurt, 2013; Elvan, 2012).

Because companies realize the benefits of reverse logistics, they make their strategy and long-term reverse logistics plan. Apart from the automotive industry, reverse logistics is found in many industries and markets, including electronics, computers, chemicals, pharmaceuticals, online sales, construction machinery and medical vehicles. Among the large companies that implement reverse logistics, there are many companies such as BMW, Delphi, DuPont, General Motors, HP, Dell, Caterpillar, Xerox, Canon, IBM, Ford, Phillips (Nakıboğlu , 2007; McAuley, 2003).

Dell: If any order is canceled or returned, almost 90% of the returns, which makes eight hundred units, are quickly made usable by refurbishing and reselling if necessary. All repurposed products are put up for sale through the Global Dell Outlet and we guarantee all of them just like new. The remaining 10%, which cannot be renewed or resold, is recycled responsibly (www.dell.com). The success of DELL, one of the leading computer manufacturers, in recycling is another example that can be given to the concept of reverse logistics.

Considering that a significant amount of waste will occur at the end of the life of automobiles, it causes environmental pollution. The selection of parts in the production of the car is a serious step in minimizing the harmful effect on the environment at the end of the car's life. The fact that these materials are composed of recyclable materials is of great importance in terms of the environment. If it is not possible, different material types should be sought instead of plastic material. Tires, which are part of automobiles, are a serious cause of environmental pollution when they are not recycled. According to the information of the Tire Manufacturers Association (LASDER), around 180,000 tons of worn tires are produced in Turkey every year. New areas of use can be created for tires that have completed their time. Truck and bus tires can be coated to be reused. Tires with high calorific value are used in cement plant, etc. It is burned in furnaces with high temperature, energy is provided and waste generation is prevented. Rubber is also used in the construction of asphalt, in building the walls that prevent hearing, and in making the tartan floor in sports and parking areas. three objectives: cost, quality, and delivery dependability. The model was designed to find the ideal number of items to order while taking into account customer demand and supplier capacity restrictions.

Japanese	English
Seiri	Sort
Seiton	Set in Order / Straighten
Seiso	Shine / Sweep
Seiketsu	Standardize
Shitsuke	Sustain / Self-discipline

Figure 1. Five-step process of 5S
Source: Whats 5S?, https://www.5stoday.com/what-is-5s/

Basically it starts with the 5S cleaning and ordering process. The purpose of 5S is to organize the working environment in the enterprise and to reduce waste to zero, and it is a process at the center of TPM studies. The names of these steps are terms taken from Japan, and names starting with the letter "S" in English. The most important advantage of this application is that it can be applied easily and it is used because of its easy structure. These steps are defined as below (Bozkurt, 2013; Elvan, 2012; Güven, 2006);

Sort :When the materials and equipment in the business are not classified, we are faced with equipment clutter. In order to ensure the order of this process, the equipment used should be classified as necessary and unnecessary, and this classification should be classified as frequently used, constantly used, never used, etc. should be classified as Such a classification will not waste time for employees in the process of finding these equipment (Bozkurt, 2013; Elvan, 2012; Güven, 2006).

Set in Order: Due to the lack of equipment to be used by the employees in the enterprises and the complicated arrangement of the equipment in case of need, the employees both waste time and get stressed during the search for the tools and reduce the efficiency of the work. Equipment used in businesses should be placed and marked by considering processes such as frequently used situations and usage points.

Shine / Sweep: Cleaning can be done in the enterprise, in the machines, around etc. It is necessary to clean the wastes that cause all kinds of pollution at the points and to take precautions by determining the processes that cause this pollution. Cleaning also helps to detect the problems that may occur in the future in the machines and to prevent the malfunctions that may occur in the machines due to pollution. Cleaning, the decrease in the efficiency of the machines in the operation, the increase in the damage at the maintenance stage and the process of finding the main source of pollution cause it to enter into a process that is just as difficult (Bozkurt, 2013).

Standardization: This step is the step of ensuring the continuity of the existing order obtained after the sorting and cleaning process by applying it continuously. Standardization is an important step towards maintaining a well-organized and dirt-free work environment. It is expected that this standardization process should be informed to the employees in writing and that the employees should also follow these rules and cooperate in this process (Elvan, 2012; Bozkurt, 2013).

Sustain / Self – discipline: The last item of the 5S step is to educate the employees on why this 5S scope is important and why it is important in terms of benefits, in order for these methods to continue as a habit within the enterprise. Managers do a great job here.

Why should 5S work be done: Waste becomes visible and easy to eliminate, this provides the Increasing control over equipment, materials and workspace. It promotes morale in the business, encourages teamwork because everyone can participate. It affects a very large area. Setting - Setup times will be shorter, Quality values, working safety and production and added value per unit time definitely increase, expenditures decrease. 5S originated as part of the Toyota Production System (TPS), a production process pioneered by Toyota Motor Business executives in the early and mid-20th centuries. This technique, often known in the West as Lean manufacturing, strives to maximize the quality of goods or services for consumers. This is frequently performed by identifying and removing waste from manufacturing operations (What is 5S?, 2022; Implementing 5S Methodology, 2022; Hiyoruki, 1995).

5S application in the applied ABC Company. It was applied in the white goods manufacturer-manufacturing industry to provide Occupational Health and Safety for a business in this Manufacturing Industry (see Table 1). This company is in Marmara Region.

The current investigation proved probably one more of the greatest significant benefits of using 5S method. This research presents that, in addition to becoming a great method for organizing and enhancing the organizational space, it is particularly necessary to assure occupational safety. The findings indicate that through employing the risk evaluation method, it could essential to minimize overall risk through up to approximately fifty percentage points by implementing 5S.

Companies should evaluate the capability of Occupational Safety and Health Management Systems for the competitive strategy when analyzing efficiency and creating performance standards. As a corporation that focuses on efficiency, a company's productivity might well be measured in terms created over time. A cost-based firm, on the other hand, must evaluate its efficiency in terms of input costs such as labor, materials etc. It's indeed vital that the productivity measurement notifies us about how well companies are operating in accordance to the critical success factors of business via the Quality management system.

Table 1. 5 Pillars of Application for ABC Company- white goods manufacturer

Japanese	English	Application Objectives-Description
Seiri	Sort	Modifications in organizational context (for example, a request for daytime cleaning); Offering cleaners greater control over the organization, speed, and timing of their job, as well as the technology and team members assigned to them; Providing possibilities for professional progression, corporate perks and rewards, and assistance from immediate managers to cleaners; This could be used to identify things in your workspace that do not help to your task. The Red Label Method was used. addressing the sources of pollution First, these pieces and things are arranged in a Red Label, and then they are collected in a centralized spot and arranged again. The ones that would not be utilized in the following step are incinerated, while the others are regularly piled and kept outside the work place.
Seiton	Setin Order / Straighten	Threat of musculoskeletal disorders; O dangers from work devices, such as electric discharge; Cleaning workers have the following occupational health problems: Musculo - skeletal problems; Workplace pressure, anxiousness, and sleeping problems Using eye-catching tactics such as labeling and colored regions, workers could discover and replace whatever they are searching for. A pleasant working atmosphere. Settlements and management that is efficient and productive.
Seiso	Shine/Sweep	Consider cleaning to be an important duty that might indirectly contribute to certain dangers and risks; analyze the risks to cleaning employees and adopt preventative strategies; communicate information with all stakeholders involved, including the customer firm, the cleaning provider, and the employees individually. Making your workplace clean and cheerful. Work engagement should be increased. Identifying and eliminating sources of pollutants. Earning the time spent searching for the material to increase productivity and effectiveness. Zero-pollution realization cleaner - better effective cleaning
Seiketsu	Standardize	Establishing a consistent overall preventative measures strategy that addresses technology, workplace requirements, conditions of employment, social connections, and the work conditions; prioritizing collective safety precautions over individual safety precautions; and providing acceptable information to the employees A four-step procedure must be performed. Arranging: Who is going to do what and when? Making Assets: Consider the equipment, resources, and timeframe for the task to be done. Implement: In ordinary life, carry out activities such as categorization, sorting, and cleaning. Regulate by tracking, comparing, and returning to the preceding step.
Shitsuke	Sustain/ Self discipline	Using fewer hazardous cleaning chemicals and performing less wet work; building design proposals; making a concerted effort to eliminate repeated and demanding arm motions and bad workplace postures; Providing possibilities for career progression, professional perks and rewards, and assistance from direct supervisors to cleaners; adequate education and training; creation and assessment of tools and procedures; transition to less hazardous cleaning solutions and less wet operations; building design ideas. Developing checklists and utilizing them on a regular basis, the findings ought to be available to everybody, and the process should be enhanced with ideas. Communicating as an everyday routine Announcement is required. Individual accountability should be assumed by both the company and the worker.

Source: Adapted from Gürlesel, 2007; Güray, 2003; Ho, 1999; Eşit, 1998; Hiyoruki, 1995 by author; opinions of the author)

In this phase of this research, 5S method implementation was examined on behalf of manufacturing efficiency, business efficiency and achievement of this manufacturing company due to outputs and inputs aspects of manufacturing system for the evaluation in terms of management with the business anticipation for an ABC Business (Manufacturer). This business is situated in Marmara Region in Turkey in white goods manufacturing.

3. Results

The production system design was analyzed to assist in the construction of the productivity for this white goods manufacturing company's manufacturing department

Due to the obvious long-term viability of Occupational Safety and Health Management Systems through the 5S Methodology, efficiency is largely determined through performance. Long-term requirements for a company's continuous existence include

innovation, work effectiveness, and productivity. It may simply be turned on if it delivers high levels of output, reliability, and performance. Efficiency is the most important metric of corporate performance since it effectively tends to reflect physical and monetary advantages. Subconsciously, nevertheless, output components do not show in effectiveness. The aim is to increase efficiency while decreasing total costs. Output percentages ought to be evaluated to assess this adjustment. The performance assessment volumes for this manufacturing firm are calculated using the 5S approach, as seen in Table 2.

Table 2. Productivity Assessment Efficiency Performance of ABC Manufacturing Enterprise

		2020	2021
Output (TL)	Sales Value of Products	195.000	355.000
Input (TL)	Labor	90.000	165.000
	Raw material	62.000	95.000
	Machinery-asset depreciation	17.000	27.000
	Others	18.000	30.000

Table 3. ABC Manufacturing Company's Labor Supply, Raw Materials, and Total Efficiency-Productivity Ratio

	2020	2021
Labor Efficiency	195.000/62.000=3,15	355.000/95.000=3,74
Raw material Efficiency	195.000/17.000=11,47	355.000/27.000=13,15
Machinery-asset depreciation	195.000/18.000=10,83	355.000/30.000=11,83
Total Efficiency	195.000/132.000=1,47	355.000/225.500=1,57

Productivity =Output / Input (1)

Labor force, raw material, and overall productivity-efficiency ratios are estimated utilizing formulas (1) and (2) for the years 2020 and 2021. Table 3 displays the computed productivity values.

Productivity Index=current period-year efficiency/base-year efficiency (2)

Labor force, raw material, and total Efficiency Ratios are calculated using the formula (2), and the efficiency increase in 2021 is used as an indicator.

Table 4. Labor Efficiency, Raw Material Efficiency, and Overall Productivity Index

Labor Productivity Index	3,74/3,15=1,19	19%	Increase - Accruement
Raw Material Productivity Index	13,15/11,47=1,15	15%	Increase-Accruement
Machinery-asset depreciation	11,83/10,83=1,09	9%	Increase-Accruement
Total Productivity Index	1,57/1,47=1,07	7%	Increase-Accruement

Compared to 2020, the change in labor productivity in 2021 (see Table 4) appears to have increased by 19%. Based on 2020, raw material productivity increased by 15% in 2021. Compared to 2020, the Machine-asset depreciation change in 2021 also increased by 9% compared to 2020. The overall productivity change index in 2021 also increased by 7%, driven by the Productivity-Labor Efficiency, Raw Material Efficiency, asset depreciation and Total Productivity Index.

5. Conclusion

Occupational safety considers job-related potential risks as well as general safety issues that could lead to injuries. Occupational Health, on the other side, investigates potential health problems and worker well-being. Considering safety to be a worker's physiological health and healthcare to be almost everything, including mental health are vital for occupational safety and efficiency of the business. Employees who are in good health are more productive. Employees should feel safe and devoted to their employment when occupational safety is implemented properly. They understand that they are being looked after at work and that they will not compromise their safety or health. This is particularly crucial because when employees speak out and express worries regarding a particularly dangerous work, they accomplish so knowing that their worries would be heard and heeded. Coworkers respect each other would perform productively if they maintain a good attitude. Occupational safety would also open up new doors in your job. Employees who have been trained could engage on the position of mental health advocates, bringing a good attitude and serving as a connecting point for their coworkers. The fundamental significance of this study is that it demonstrated that a well-planned and monitoring system may reduce potential risks and increase work safety and working condition effectiveness. Thus, in order to maintain long-term success, firms must constantly evaluate risk, engage in strategy, and practice proactive risk management. Sustainable involvement and monitoring initiatives could be created to have a beneficial impact on the development of workplace safety and environmental efficiency. Employees must take the responsibility and cooperate together to safeguard their personal and their colleagues' health and safety. According to the Basic Strategy on Occupational Health and Safety of Business, the organization works to safeguard the occupational health and safety of all department workers and executives, suppliers operating on construction locations, business associates, and other associated organizations. The complexity of a state's financial, social, cultural, political, and technical framework is critical to the adoption and long-term viability of occupational health and safety management systems. As a result, each state may develop its own management structure based on its internal politics. Regardless of

the fact that wealthy countries perform out these management can help, emerging countries have difficulty executing them out. The safety environment is a critical element in ensuring success. To develop an effective management platform, occupational health and safety practices must be adopted as a life habit, largely by the persons who would be subjected to these management solutions. The social infrastructure, technology development, and the insecurity of the political landscape would all be considered in the management platform that would be adopted in the state. Moreover, the proposed framework should attempt to consider population's behavior responses and attitudes. As a result, when developing the management platform, it is important to design strategies that do not contradict societal norms and do not overlook the framework of the nation's working environment. Establishing an ergonomic working environment for the employee will increase efficiency and significantly reduce work accidents. All necessary measures should be taken to ensure that the work equipment and raw materials used in the workplace are suitable for the work to be done and that this equipment does not harm the employees in terms of health and safety. When choosing work equipment, it should be noted that the use of this equipment does not pose an additional hazard, taking into account the special working conditions in the workplace and the dangers in terms of health and safety. If it cannot guarantee that the work machinery is entirely safe for the employees' health and safety, necessary steps should be made to decrease the risk to an acceptable level. Furthermore, employees who are assigned to utilize work equipment by the employer should be trained on the hazards that may result from their use and how to prevent them. Employees need to be provided with sufficient particular education in the repairing, modification, monitoring, and maintenance of work machinery.

According to the risk hierarchy, which is scientifically proven and supported by facts, with the measures to be taken at the design stage regarding occupational health and safety, the work to be done on how the relationship between the designer. The risks of occupational accidents can be eliminated to a large extent during the project phase by making some changes, sometimes with additions in the design, and making some changes at a very low cost even in the preliminary design phase of the manufacturing. If the maturation that design would create in the occupational safety culture is realized, the catastrophic value of occupational accidents can be reduced and healthier and safer working environments can be created.

References

Amponsah-Tawiah, K. (2013). Occupational Health and Safety and Sustainable Development in Ghana. International Journal of Business Administration, 4(2), 74-78, doi:10.5430/ijba.v4n2p74.

Behm, M. (2005). Linking construction fatalities to the design for construction safety concept. Safety Science, 43(8), 589–611. doi:10.1016/j.ssci.2005.04.002

BHPbilliton (2005), Health, safety, environment and community management standards: BHP Billiton HSEC management standards, no. 3, 1-8. https://www.bhp.com/-/media/bhp/regulatory-information-media/coal/bhp-billiton-mitsubishi-alliance/caval-ridge/environmental-impact-statement-eis-appendices/creisappr3hsecmanagement.pdf

Bonafede, M., Corfiati, M., Gagliardi, D., Boccuni, F., Ronchetti, M., Valenti, A., … Iavicoli, S. (2016). OHS management and employers' perception: differences by firm size in a large Italian company survey. Safety Science, 89, 11–18. doi:10.1016/j.ssci.2016.05.012.

Bozkurt, O. (2013). Uçuş Hattı Seviyesi Bakım İşlemlerinde Toplam Verimli Bakım Sisteminin Uygulanabilirliği. Endüstri Mühendisliği Anabilim Dalı, Yüksek lisans tezi, Eskişehir Osmangazi Üniversitesi Fen Bilimleri Enstitüsü, 98 p.

Çavuşoğlu, M. (2008). Toplam Verimli Bakım Uygulamalarının Ekipman Performansına Etkilerinin İncelenmesi ve Özel Sektörde Bir Uygulama. Yüksek lisans tezi, Savunma Bilimleri Enstitüsü, Malzeme Tedarik ve Lojistik Yönetimi Ana Bilim Dalı. Ankara: Kara Harp Okulu, 234 p.

Çakıroğlu, N. (2007). İş sağlığı ve Güvenliği Yönetim Sistemi Kapsamında Risk Analizi Denetim ve Bir Firma Uygulaması, Yüksek lisans tezi, Dokuz Eylül Üniversitesi, Sosyal Bilimler Enstitüsü, 161 p.

Earn The Art & Science of Manufacturing Improvement from Vorne, https://www.leanproduction.com/5s/ (Access Date: 10.05.2022).

Elvan, F. (2012). Türkiye'de Başarılı Toplam Verimli Bakım Uygulaması Yapan Seçilmiş Kuruluşların Kıyaslanması. Yüksek lisans tezi, Fen Bilimleri Enstitüsü, Makine Mühendisliği Anabilim Dalı. Kayseri, Erciyes Üniversitesi, 176 p.

Everly, G. S., Jr., (1986). An introduction to occupational health psychology, P. A. Keller & L. G. Ritt (Eds.), Innovations in clinical practice: A source book, p.5, (1986), 331-338, Sarasota, FL: Professional Resource Exchange.

Eşit, C.(1998). 5S-Endüstriyel Temizlik ve Düzen, Yayınlanmamış Seminer Notları, (1998).

European Agency for Safety and Health at Work (2007), Facts 76/EN National economics and occupational safety and health. Bilbao, Spain: European Agency for Safety and Health at Work. https://european-union.europa.eu/institutions-law-budget/institutions-and-bodies/institutions-and-bodies-profiles/eu-osha_en.

Frijters, A. C. P. and Swuste, P. H. J. J. (2008). Safety assessment in design and preparation phase. Safety Science, 46(2), 272–281. doi:10.1016/j.ssci.2007.06.032.

Gallagher, C., Underhill, E. and Rimmer, M. (2001).Occupational Health and Safety Management Systems: A Review of their Effectiveness in Securing Healthy and Safe Workplaces. National Occupational Health and Safety Commission Sydney, 1-82. https://www.safeworkaustralia.gov.au/system/files/documents/1702/ohsmanagementsystems_reviewofeffectiveness_nohsc_2001_archivepdf. pdf).

Gambatese J. and Hinze J., (1999). Addressing construction worker safety in the design phase: Designing for construction worker safety. Automation in Construction, 8(6), 643-649, doi:10.1016/s0926-5805(98)00109-5.

Gambatese, J.A, Behm, M. and Rajendran, S. (2008). Design's role in construction accident causality and prevention: Perspectives from an expert panel. Safety Science, 46(4), 675-691. doi:10.1016/j.ssci.2007.06.010.

Genç, A. (2007). Toplam Verimli Bakım ve Uygulaması.Yüksek Lisans Tezi, Fen Bilimleri Enstitüsü, Makine Mühendisliği Anabilim Dalı. Kayseri: Erciyes Üniversitesi, 147 p.

Güray, B. Z. (2003). 5S Yaklaşımı ve Bir İşletmede İncelenmesi, Osmangazi Üniversitesi, Mühendislik Mimarlık Fakültesi, Endüstri Mühendisliği Bölümü, Yayınlanmamış Bitirme Tezi.

Gürlesel, C. F.(2007).Tekstil sektörü için dönüşüm stratejileri.

http://www.tekstilisveren.org/index2. Access Date: 12.07.2015.

Güven, K. (2006). Periyodik Bakım Yapan Tekstil işletmesinde Bilgisayar Destekli Toplam Verimli Bakıma Geçiş (TVB) ve Kaliteye Etkisi. Yüksek Lisans tezi, Fen Bilimleri Enstitüsü, Makine Mühendisliği Anabilim Dalı. Kayseri: Erciyes Üniversitesi, 229 p.

Haslam, C., O'Hara, J., Kazi, A., Twumasi, R. and Haslam, R. (2016). Proactive occupational safety and health management: Promoting good health and good business. Safety Science, 81, 99–108. doi:10.1016/j.ssci.2015.06.010.

Hasle, P., Kvorning, L. V., Rasmussen, C. D. N., Smith, L. H. and Flyvholm, M.-A. (2012). A Model for Design of Tailored Working Environment Intervention Programmes for Small Enterprises. Safety and Health at Work, 3(3), 181–191. doi:10.5491/shaw.2012.3.3.181.

Hasle, P. and Limborg, H. J. (2006). A Review of the Literature on Preventive Occupational Health and Safety Activities in Small Enterprises. Industrial Health, 44(1), 6–12. doi:10.2486/indhealth.44.6.

Hiyoruki, H. (1995). 5S for Operators: 5 Pillars of The Visual Workplace, The productivity press development team, Productivity Press, 1st Edition, 136 p.

Ho, S. K. M. (1999). 5-S practice: The first step towards total quality management. Total Quality Management, 10(3), 345–356. doi:10.1080/0954412997875.

Hudson, P. (2000). Safety Management and Safety Culture the Long, Hard and Winding Road. Proceedings of the First National Conference. University of Western Sydney, Australia. July.

Implementing 5S Methodology: The First Step Toward Workplace Efficiency, https://www.simplilearn.com/implementing-5s-methodology-to-achieve-workplace-efficiency-article, (Access Date: 10.05.2022).

International Organization for Standardization (ISO). https://www.iso.org/standard/63787.html (Access Date: 27.02.2019).

Jilcha, K. and Kitaw, D. (2017). Industrial occupational safety and health innovation for sustainable development. Engineering Science and Technology, An International Journal, 20(1), 372–380. doi:10.1016/j.jestch.2016.10.011.

Judith, H. (2013), A guide to health and safety regulation in Great Britain, http://www.hse.gov.uk/pubns/hse49.pdf, s.1-26 (Access Date: 10.06.2022).

King, A.A., Lenox, M.J. and Terlaak, A. (2005). The strategic use of decentralized institutions, exploring certification with the ISO 14001 management standard. Academy of Management Journal, 48, 1091–1106. doi:10.2307/20159731.

Li, Y. and Guldenmund, F. W. (2018). Safety management systems: A broad overview of the literature. Safety Science, 103, 94–123. doi:10.1016/j.ssci.2017.11.016.

Mohandes, S. R. and Zhang, X. (2021). Developing a Holistic Occupational Health and Safety risk assessment model: An application to a case of sustainable construction project. Journal of Cleaner Production, 291, 125934. doi:10.1016/j.jclepro.2021.125934.

Molamohamadi, Z. and Ismail, N. (2014). The relationship between occupational safety, health, and environment, and sustainable development: A review and critique. International Journal of Innovation, Management and Technology, 5(3), 198-202. https://www.doi.org/10.7763/IJIMT.2014.V5.513.

Mutlu, N. G. and Altuntas, S. (2019). Risk analysis for occupational safety and health in the textile industry: Integration of FMEA, FTA, and BIFPET methods. International Journal of Industrial Ergonomics, 72, 222–240. doi:10.1016/j.ergon.2019.05.013.

Nawaz, W., Linke, P. and Koç, M. (2019). Safety and Sustainability Nexus: A Review and Appraisal. Journal of Cleaner Production, 216, 74-87, doi:10.1016/j.jclepro.2019.01.167.

Pinto, A. (2014). QRAM a Qualitative Occupational Safety Risk Assessment Model for the construction industry that incorporate uncertainties by the use of fuzzy sets. Safety Science, 63, 57–76. doi:10.1016/j.ssci.2013.10.019.

Rabinowitz, Randy S. and Hager, Mark M.(2000). Designing Health and Safety: Workplace Hazard Regulation in the United States and Canada , Cornell International Law Journal,33(2), 374-734, https://scholarship.law.cornell.edu/cilj/vol33/iss2/3.

Ramos, D. G., Arezes, P. M. and Afonso, P. (2017). Analysis of the return on preventive measures in musculoskeletal disorders through the benefit–cost ratio: A case study in a hospital. International Journal of Industrial Ergonomics, 60, 14–25. doi:10.1016/j.ergon.2015.11. 003.

Robson, L. S., Clarke, J. A., Cullen, K., Bielecky, A., Severin, C., Bigelow, P. L., … Mahood, Q. (2007). The effectiveness of occupational health and safety management system interventions: A systematic review. Safety Science, 45(3), 329–353. doi:10.1016/j.ssci.2006.07.003.

Robson, L. S., Stephenson, C. M., Schulte, P. A., Amick, B. C. I., Irvin, E. L., Eggerth, D. E., … Grubb, P. L. (2012). A systematic review of the effectiveness of occupational health and safety training. Scandinavian Journal of Work, Environment & Health, 38(3), 193–208. doi:10.5271/sjweh.3259.

Rocha, R. S. (2010). Institutional effects on occupational health and safety management systems. Human Factors and Ergonomics in Manufacturing & Service Industries, 20(3), 211–225. doi:10.1002/hfm.20176.

Rodriguez Guzman J. (2018). Occupational health in the Americas. http://icoh. confex.com/icoh/2012/webprogram/Paper8267.html, Access Date: 11.09.2018.

Szymberski, R. (1997). Construction Project Safety Planning. TAPPI Journal, 80(11), 69-74.

Torrecilla-García, J. A., Pardo-Ferreira, M. del C., Rubio-Romero, J. C., Calero-Castro, S. J. and Nebro-Mellado, J. J. (2021). Assessment of research, development and innovation in occupational health and safety in Spain. Safety Science, 141, 105321. 1-7, doi:10.1016/j.ssci.2021.105321.

Von Thiele Schwarz, U., Hasson, H. and Tafvelin, S. (2016). Leadership training as an occupational health intervention: Improved safety and sustained productivity. Safety Science, 81, 35–45. doi:10.1016/j.ssci.2015.07.020.

Weinstein, M., Gambatese, J., & Hecker, S. (2005). Can Design Improve Construction Safety?: Assessing the Impact of a Collaborative Safety-in-Design Process. Journal of Construction Engineering and Management, 131(10), 1125–1134. doi:10.1061/(asce)0733-9364(2005)131:10(1125).

What is 5S?, https://www.5stoday.com/what-is-5s/ (Access Date: 10.05.2022).

WHO (1994). Global strategy on occupational health for all: the way to health at work. Recommendation of the second meeting of the WHO Collaborating Centres in Occupational

Health, Beijing, China, http://www.who.int/occupational_health/globstrategy/en/, 1994.

WHO (2012). Health indicators of sustainable jobs, presented at Initial findings from a WHO Expert Consultation, 17–18, 2012. https://cdn.who.int/media/docs/default-source/environment-climate-change-and-health/sustainable-development-indicator-jobs.pdf?sfvrsn=e40fc22c_2 (Access Date: 10.05.2022).