

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 11, November 2018

The Importance of Occupational Health and Safety in Working with Heavy Duty Machines

Sermin Kun¹, M. Kemal Özfirat²

MSc. Student, Department of Heavy Equipment Operator, DEU Bergama Vocational School, Bergama, İzmir, Turkey¹

Associate Professor, Department of Mining Engineering, Dokuz Eylül University, Buca, İzmir, Turkey²

ABSTRACT: With developing technology, people preferred faster, more economical and safer way of working that they would spend less effort and save time, and thus construction equipment was increasingly taken its place in our business life and daily life. Besides the mentioned benefits of construction equipment extremely used especially in sectors such as mining, construction, agriculture, sea transportation, automotive etc., their shares in the occupational accidents that occurred in the aforementioned industry branches increased in recent years because of misuse or unconsciousness. This prepared study emphasized an analysis of occupational accidents that occurred in Turkey's different sectors and general situation in recent years, the share of construction equipment in occupational accidents as well as the risks in the usage of construction equipment and the action plan developed to avoid these risks. Although the conducted study is specific to Turkey, the risks identified and the measures to be taken are in global scale since the place and way of machine and equipment usage are the same in almost all over the world.

KEYWORDS: Occupational Health And Safety, Heavy Duty Machines, Risk Management

I. INTRODUCTION

The fact that human started to use tools and machines made by themselves, became a major step in social life. Thus, people got an opportunity to control and transform nature continuously with working tools they made [1]. In this process, production tools and employees in the working environment are in constant interaction. As a result of this, various health and safety problems became a current issue and therefore the rules to be followed for safe work and occupational health were created in working with machine and equipment.

Industrialization changed by the fast-moving science and technology across the world, undoubtedly had an effect on the development process of countries. However, it is difficult to say that the same success was achieved for a healthy and safe working environment, occupational health and safety [1]. With industrialization and development, machine and equipment with highly developed dimensions and functions were utilized in almost every sector, especially after the Second World War. Therefore, dangers and risks arising from usage occurred. The most effective way to prevent occupational accidents and diseases is to identify, assess and prevent risks. Some of the first fields coming to mind where relevant construction equipment is used; are construction, mining, agriculture and automotive sectors. The study includes figures and tables of occupational accidents in these sectors in Turkey. Moreover, the study also emphasized the place and importance of construction equipment usage in the occurrence of occupational accidents.

II. OCCUPATIONAL ACCIDENTS STATISTICS IN TURKEY AND RELATED WORK

As in the world, the historical development of occupational health and safety in Turkey went through the similar phases depending on developments and needs in working life. The fact that occupational accidents become a current issue as an important problem, increased with the development of industrialization [1].

As in many developed and developing countries of the world, Turkey also keeps the statistical information of occupational diseases and occupational accidents occurred and Social Security Institution (SSI) continues this procedure. Each year, SSI shares the statistics of occupational accidents and occupational diseases of the previous

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 11, November 2018

year or two years ago. The number and rate of occupational accidents compiled by SSI between 2012 and 2016 are given below. These statistics, which are much more detailed, were utilized at this phase in general.

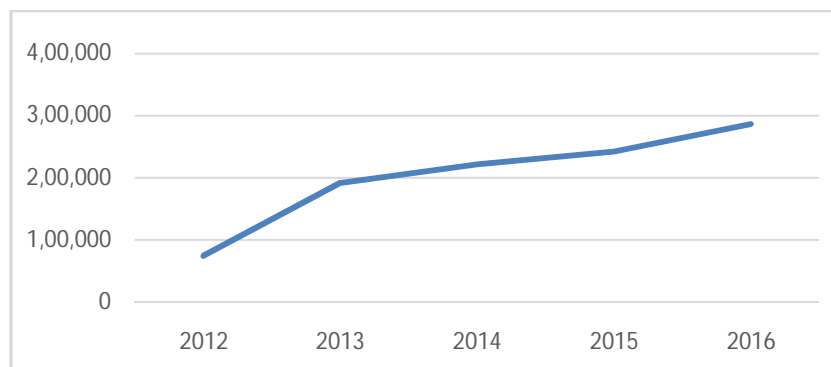


Fig.1. Number of occupational accident between the years of 2012 – 2016

Table 1. Increases in occupational accidents between the years of 2012-2016

Year	Increase (%)
2012-2013	291
2013-2014	15,66
2014-2015	10,91
2015-2016	11,08

According to the respective data, it is generally seen continuous and significant increases in the number of occupational accidents in 2012-2016. While the number of occupational accidents was 74,871 in 2012, this number increased incrementally to 191,389 in 2013 and to 221,366 in 2014. The number of occupational accidents was 241,547 in 2015 and the number of occupational accidents in 2016 was recorded as 286,068 [9]. Accordingly, Table 1 shows the rate of increase in the accidents between 2012 and 2016. Furthermore, the numerical values of accidents occurring in figure 1 are given graphically.

When the distribution of occupational accidents between 2012 and 2016 is analyzed on sectoral basis, almost the same sectors are leading. For example, in 286,068 occupational accidents occurred in 2016; construction sector ranked first with 44,552 (15.57%) accidents, basic metal industry ranked second with 33,697 accidents (11.77%), food production and food and beverage service activities ranked third with 26,977 accidents (9.43%). When the values of the last five years are analyzed, these sectors appear as construction, mining and metal production sectors in general. These sectors attract attention with the fact that they are the working area where construction equipment is used intensively.

III. OCCUPATIONAL HEALTH AND SAFETY IN WORKING WITH HEAVY DUTY MACHINES

Based on the general definition of occupational accidents, occupational accident refers to the event that occurs during the performance of the work with regard to the work performed by the policy holders in essence. International Labor Organization (ILO) defined occupational accident as “an unexpected and unplanned event that caused a certain damage or injury.” World Health Organization (WHO) defined occupational accident as “an unexpected and unplanned event that causes a certain damage or injury and that causes production to stop for a while” [4].

The definition of occupational health and safety is defined in Occupational Health and Safety Law No. 6331 as “occupational health and safety is systematic and scientific studies conducted for the purpose of protection from conditions that arise from various reasons during the performance of the work and that may cause harm to health and safety [5]. The most important (primary) objective of occupational health and safety is to protect employees against occupational accidents and occupational diseases. For all intents and purposes, government, employer and employees

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 11, November 2018

have different but complementary duties for occupational health and safety. The duty of the government is to enact legislation, to ensure organization, to review compliance with the legislation and to impose sanctions [2]. The duty of the employer is to ensure legal working environment, to provide training to employees in this regard and the duty of the employees is to fulfill the duties given to them in accordance with occupational health and safety by considering OHS trainings. When one of the three rings of this chain breaks, occupational accidents or occupational diseases arising out of working environment and conditions occur.

As mentioned in the general information given above, the reason for the occurrence of occupational accidents is human, machine and environmental factors depending on working environment and conditions. The essential equipment of service and production processes, especially in sectors such as construction and mining, are heavy duty machines. Machine-related occupational accidents occur due to many reasons such as not selecting the suitable machines for the work to be performed, the usage of the selected machine rather than its purpose, inactive warning sections of the machine, late maintenance and repair processes, operator usage errors, parking in inappropriate position and conditions. However, machine-related noise, vibration and exposure to dust caused by the machine in working with construction equipment cause occupational diseases in employees. Moreover, the situation of driving construction equipment on road as required by the working conditions causes occupational accidents as well as traffic accidents. According to the figures of 2017 traffic accidents of General Directorate of Highways, 137 of 81,139 vehicles involved in the accident were construction equipment by the type of the vehicle. In traffic accidents occurred in Turkey, accidents caused by construction equipment take a significant place. The measures to be taken after determining dangers and possible risks of construction equipment, the leading causes of occupational accidents will decline the rate of occupational accidents seriously.

IV. ACTION PLAN TO BE USED HEAVY DUTY MACHINES

When the general distribution of occupational accidents in Turkey in recent years is analyzed, construction and mining sectors appear particularly in the first row. These sectors attract attention as the sectors where heavy duty machines are used intensively. The accidents caused by the construction equipment in occupational accidents occurred in sectors have a great number. In occupational safety studies to be conducted in order to reduce the number of accidents occurred, the first place should be the determination of the dangers arising from the production processes and the environment in the workplace during their completion. It is necessary to know the characteristics of workplace, production technology, production tools, machine and other equipment and working conditions in order to determine the dangerous situations that cause occupational accidents.

While determining the dangers arising from the production process and the nature of the work; they should be sorted by work load, importance and priority. Accident statistics in previous periods should be considered in order to minimize probable accident risk and accident analysis should be performed. This situation is quite important and necessary for the analysis of probable accidents and dangerous situations in the following years. However, 'insecure condition' and 'insecure action' should be identified, assessed and the results should be recorded after occupational accident occurred. A complete and accurate analysis has a great importance in terms of protection from similar accidents. Thus, it will be possible to reveal unforeseen or unpredictable dangers.

Priority for the prevention of occupational accidents and occupational diseases and the protection and improvement of the health of employees is the elimination of the dangers in the workplace. In cases where it is not possible to eliminate the danger completely, it is necessary to assess the risks that will arise from dangers and to get them to the level that will not harm to the employees, the workplace, machine and equipment with the collective protection measures to be taken at the source first [1].

Security measures to be taken should be determined according to the nature of the dangers identified and analyzed. Security measures should be developed to prevent dangers from occurring by considering working conditions and production methods. In order to eliminate dangerous situations, correct insecure behaviors and prevent accidents that may occur, protective varieties should be determined in accordance with the nature of the work performed and the function of the production tools and the most effective one should be selected. The above-mentioned situations should be evaluated and implemented in an order shown in figure 2 to notice dangers and risks arising from the

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 11, November 2018

construction equipment in their places and on time, and to take the necessary measures.

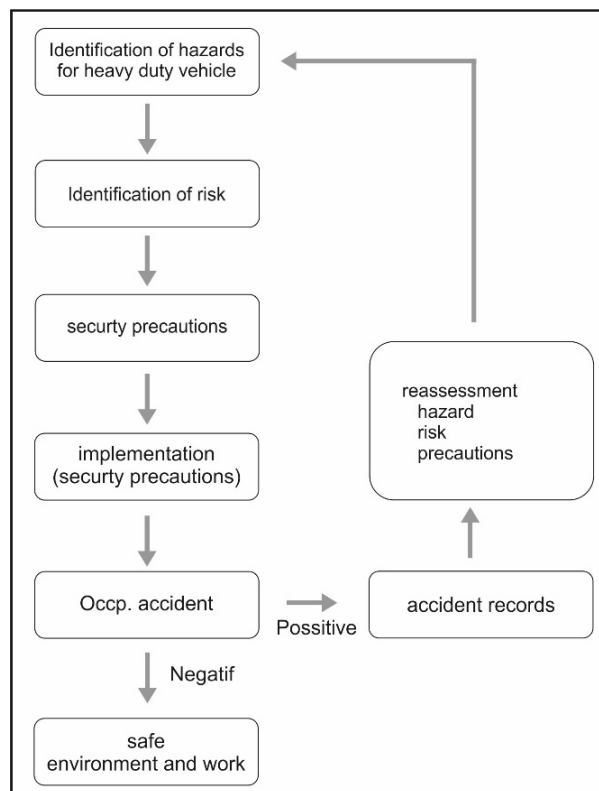


Fig. 2. Safe working plane for heavy duty vehicle.

According to ILO data (Creating Safe and Healthy Workplaces for All, Laborstat); There are around 3 billion workers in the world, including 1.2 billion women. Every 15 seconds, a worker dies from occupational accidents or occupational diseases in the world. Every 15 seconds, 160 workers have occupational accidents and every day approximately 6,400 people die from occupational accidents or occupational diseases. Each year, 270 million occupational accidents occur and more than 313 million workers suffer from non-fatal occupational accidents. Moreover, approximately 350 thousand people dies from occupational accidents and 2 million people die from occupational diseases every year [7]. This statement expresses the loss of qualified labor force, the working class who is partially or completely disabled and who usually experiences psychological problems. From the perspective of the employer, the occupational accident as well as psychological breakdown experienced may cause significant costs in material terms. Companies face with; treatment expenses, legal expenses, indemnities, temporary and/or permanent disability allowances, penalties, labor, workday and production losses, repair and maintenance of damaged equipment, expenses for re-supply of raw materials and many other costs. Moreover, this causes loss of cost and time for social security institutions and other institutions. The lost labor force, the lost work day, production losses, the damage suffered by the society are the indirect damages of the occupational accidents to the country's economy. The need for more systematic and more planned working for the issue with such intense losses and increasing numbers with each passing day is especially essential for developing countries. It is vital to place the occupational health and safety awareness in all classes of the society so that both employers and workers do not face such serious problems.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 11, November 2018

V. CONCLUSION

Occupational Health and Safety is one of the most fundamental elements of the working life that is an important problem with the above-mentioned losses around the world, that concerns all employees, that affects employer with its economic dimension and the government with social security dimension. The lack of a healthy and safe working environment in all aspects for employees is one of the most important problems of working life today. Depending on the intensity of the problems and the social reactions, solutions should be offered and implemented.

In the context of occupational health and safety, the most basic parameter for heavy construction equipment is the operator having certificate of operation and G class driving license. Operators are subject to a training program to obtain this license. In all trainings and trainings that should be given by the employer when the operator is employed, construction equipment operator should have a culture of occupational health and safety and be competent in the emergency interventions that should be carried out in case of emergency. The operator should know that occupational accident will occur as a result of the dangerous situation and dangerous behavior, and this situation may be prevented indeed. While checking the dangerous situation by turning around the machine before start to work, the operator should individually control the systems commanding construction equipment before and after the equipment starts. People responsible for operation should ensure that they fully control the loading and unloading area. Employees should not be allowed to be under the load removed by the construction equipment. Maintenance of construction equipment should be performed regularly and their traceability should be ensured. Insecure construction equipment may endanger the lives of many personnel. The insecure working environment may be eliminated through regular checks and inspections by the employer. The effects of insecure construction equipment and insecure behavior may be reduced by eliminating the insecure working environment. The operator should also wear personal protective equipment such as helmets, safety belts, safety glasses, gloves, reflector vests, and headphones. When parking the vehicle, the operator should absolutely drop the attachments to the floor. When getting out of the vehicle, the operator should get out safely using door handles handrails and steps. The operator should absolutely stop the engine while carrying out maintenance and repair. The operator should be sure that there is no one around before moving the vehicle. The operator should only use the vehicle he/she is trained for. He/she should not use construction equipment in different works other than its function and not exceed the maximum working capacity. He/she should determine the route of dangerous lines such as power lines and check the working area. Moreover, the operator should use construction equipment within the speed limits specified in the law.

In order to prevent occupational accidents, operator and all employees of the company should be trained about occupational accidents caused by heavy duty machines. Other personnel should also be told what to pay attention when the construction equipment is in the parking position or working position in the working environment. Thus, possible risks are prevented by a study in accordance with the flow chart given in the study and a system including everyone.

REFERENCES

- [1] UCTEACHamber of Mechanical Engineers healthy and safety report, mmo/689 ISBN: 978-605-01-1183-, vol.5, 2018.
- [2] G. Alp, G. Tülin , "Study of risk analysis in work machines used in port", Journal of Engineering Sciences and Design, vol.5, pp.127-144, 2017.
- [3] Kun, S. Technical and performance analysis of heavy work machines widely used in open pit mines.Msc. Thesis. pp144, 2014.
- [4] UCTEACHamber of Civil Engineers, Third Occupational Health and Safety Symposium Proceedings Book,vol.1, pp.13-25, 2011.
- [5] Official journal, Occupational Health and Safety Law No. 6331.
- [6] The Constitution of the Republic of Turkey,1982.
- [7] ILO, Encyclopaedia of Occupational Health and Safety (Fourth Edition), ILO, 2012.
- [8] www.resmigazete.gov.tr
- [9] www.sgk.gov.tr