



A Study on Occupational Safety and Risk Situations of Some Agricultural Machinery Factory in Balıkesir

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Abstract In this study it is aimed to state risks and give information about the Occupational Health And Safety situations and practices of the agricultural machine companies in the Balıkesir region by defining the effectiveness and viability of the OHS practices in those companies. Within this scope the risk analysis practices of the companies were made within the context of OHS by using 5x5 L matrix table and the necessary precautions were defined. Results of the research shows that the risk scores are generally high or very high. In this study solutions were proposed for problems and precautions to take were defined for similar companies. This study is aimed to enlighten relevant experts, academicians and the other organizations which are members of the same sector.

Keywords occupational safety, risk analysis, agricultural machinery, Balıkesir

1. Introduction

The concept of occupational health and safety; is the field of science which aims to reduce and eliminate the health problems and occupational risks that affect the employees and individuals in the workplace during work. Occupational health and safety can be defined as a science which investigates all the factors and conditions that affect the individuals (employee, temporary worker, subcontractor, guest, customer or anyone in the workplace) to ensure their health and safety.

Occupational safety is the methods which aim to protect everyone in the workplace from all kinds of possible accidents and risks that may arise in the workplace and have them work in a more humane, safe and healthy environment. In the broad sense; it is the integration of practices which aim to protect everyone in the workplace from hazards and risks as well as to ensure the continuity and safety of production and to protect the environment and everyone that is affected.

Occupational safety is a term which can be explained as to ensure the health and safety of employees, to take necessary precautions against all kinds of work accidents and risks that may occur in the workplace, to provide the necessary tools and equipment for these precautions. In occupational safety these precautions are usually the responsibility of the employer but the employees also have to follow the conditions and necessities. Protecting employees from occupational accidents and occupational risks and educating them in this area is the basis of Occupational Health and Safety. The measures taken in this matter and Fifth Section of Labor Law No. 4857 are reserved for occupational health and safety. Relevant articles include employer obligations on the subject of occupational health and safety, halting or closing the operations of the organizations in cases of failing to comply with the measures of occupational health and safety, workplace organization on the issue of occupational health and safety and protection of women and child workers in the workplace.

With the increased value of human resource in business life, occupational health and safety (OHS) studies also increased. Occupational health and safety (OHS) studies aim to ensure that employees are working in a safer,



healthier and humanitarian environment. It is clear that OHS studies protect people from occupational risks thus preserving physical and mental health. Especially in developed and developing countries occupational health and safety plays an important role in development [1].

2. Background

Developing technology and the increase of mechanization in manufacturing processes have increased the risks regarding occupational health and safety. To take measures against these risks will increase the morale and motivation of employees thus increase the performance and production capacity. In this way both employee and employer will benefit and their contribution to the economy will increase. In order to recognize these it is necessary to determine these risks with risk analysis method and take necessary precautions.

In this study, hazards and risks that are visible and invisible in the workplaces of some agricultural machinery manufacturers operating in Balıkesir province are determined and the effects of these risks are examined and the necessary precautions to be taken are stated. In this way, it is aimed to raise the awareness of employees and the employer about these issues. Thousands of employees are exposed to risk of occupational diseases or work accidents because of failing to comply with occupational health and safety measures. This situation affects not only the employees themselves but also the family, social environment and social structure. It is an undisputable fact that in addition to mental effects, work accidents and occupational diseases cause physical costs and these costs have a negative impact on economy. Measuring the 263 risks in 3 firms included in the study will raise the awareness of employees and employers regarding occupational health and safety. In this regard, the measures taken in this field will become widespread and every segment of society will benefit.

3. Material and Methods

3.1. Description of the case study and data sets

During the selection of the firms, interviews were conducted with the managers of 7 firms operating in the related sector, and 3 firms were chosen who voluntarily accepted the risk analysis and the publication of the study in the condition of protection of the principle of confidentiality.

3.2. Methodology

In this study, risk analysis, in accordance with the principles and legislation of occupational health and safety, are performed on 3 different firms in agricultural machinery manufacturing sector, applying the L type 5x5 matrix method.

Risk Management

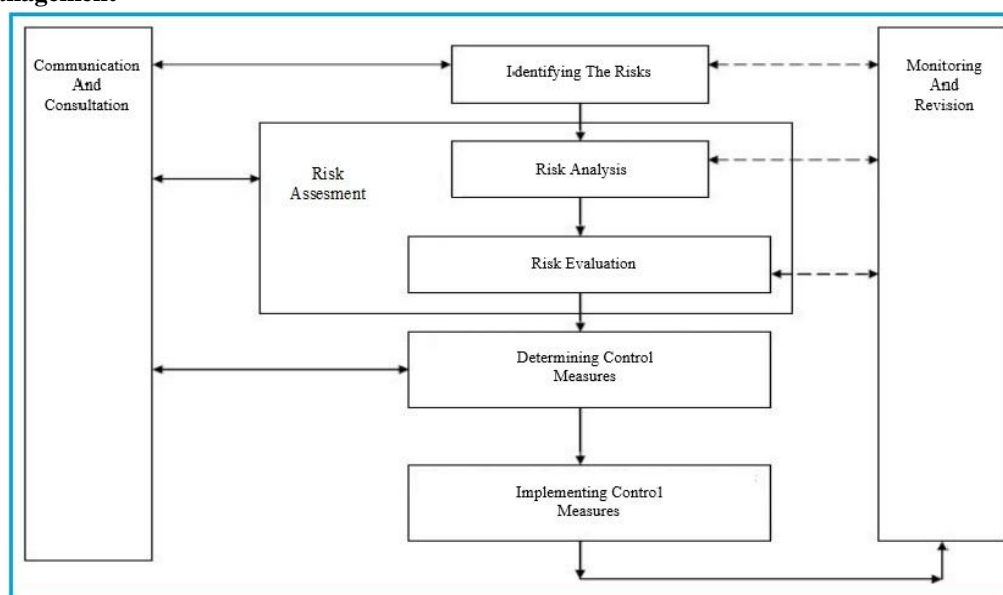


Chart 1: Risk Management Cycle [2].



Risk management is expressed in a cycle consisting of four steps according to the Education Notes on Occupational Health and Safety Risk Assessment and Rating which is published by Turkish Standards Institute in 2004. The steps taken throughout the process are defined as determining the risks, assessing risks, determining control measures and implementing control measures [2].

Risk Analysis;

Risks analysis and assessment, which is one of the most important steps in the risk assessment cycle, is of great importance both to the process and to the institutions. If carried out by wrong methods or by non-experts, it will not be possible to determine the risks or the levels of these risks correctly. The risk analysis process which must be carried out in accordance to certain standards and methods has been defined by the International Health and Safety Executive (HSE) in 5 fundamental steps [3].



Chart 2: Risk Evaluation Process [3]

L Type 5x5 Matrix Diagram in Risk Analysis;

L type 5x5 matrix diagram is used as the risk analysis method in the study. This Assessment system is used to make analysis based on cause-and-effect relationships. The method is preferred by evaluatırs who do not require advanced expertise because it is particularly simple and is one of the most commonly preferred methods for risk analysis in occupational health and safety.

Table 1 5X5 Risk Assessment Table

| LIKELYHOOD | CONSEQUENCES | | | | |
|-----------------|-----------------|-------------|--------------|-------------|-----------------|
| | 1 (Very Low) | 2 (Low) | 3 (Moderate) | 4 (High) | 5 (Very High) |
| 1 (Very Low) | Insignificant 1 | Low 2 | Low 3 | Low 4 | Low 5 |
| 2 (Low) | Low 2 | Low 4 | Low 6 | Moderate 8 | Moderate 10 |
| 3 (Moderate) | Low 3 | Low 6 | Moderate 9 | Moderate 12 | High 15 |
| 4 (High) | Low 4 | Moderate 8 | Moderate 12 | High 16 | High 20 |
| 5 (Very Likely) | Low 5 | Moderate 10 | High 15 | High 20 | Unacceptable 25 |



L type 5x5 matrix table is used in this study because it is easy to use, produces fast results and is easy to understand by everyone. Support was received from experts during the analysis and authorities of the workplace were present. Risks were scored from 1 to 5 according to their insety and by scoring the possibilities also in the same way and multiplying these two values risk levels were determined.

Table 2: Chart of Risk Results

| Colour | Risk Value | Assessment | Action |
|--------|------------------|--------------|--|
| Red | 15, 16, 20, 25 | Unacceptable | Action must be taken immediately against these risks |
| Yellow | 8, 9, 10, 12 | Notable | Action must be taken as soon as possible against these risks |
| Green | 1, 2, 3, 4, 5, 6 | Acceptable | Action can be taken in the long term against these risks |

After their calculation risk values are categorized as red, yellow and green according to their levels which means unacceptable, notable and acceptable risks. The identified risks and Assessments are presented in the Annexes as risk analysis tables.

4. Results and Discussion

The manufacturing activity in the three firms, which the risk Assessment is applied, continues throughout the year. Employees are informed from time to time and some mandatory precautins are taken. However, it is observed that these precautions are inadequate and that occupational health and safety is not considered enough. It has been determined that small-scale work accidents have been experienced before. Occupational safety is not taken into account even though it is a sector with high risk levels. Information about occupational health and safety is usually short and theoretical and the employees are not sufficiently informed about the maintenance and the use of machine or as well as the workplace.

Risk Analysis Application and Assessment

In the risk analysis using the L type matrix table, 102 risks are identified in Firm A of which 68 are unacceptable risks and 34 are notable. In Firm B 83 risks are identified of which 40 risks are unacceptable and 43 are notable. In Firm C 77 risks are identified of which 30 risks are unacceptable and 47 notable. Measures to be taken against these risks are specified in accordance with legislation and receiving expert opinion, they are presented as tables in the annex and detailed in the content. During risk Assessment previously encountered problems and risks are taken into account. Legislation regarding the subject is also presented in the annexes.

Risks in entry section

During the Assessment of risk and hazard sources in the entry section in 3 firms, it is determined that there are unacceptable risks such as the absence of fire extinguishers and assembly position marks, lack of security personnel, irregular and scattered positioning of materials, extinguishers and tools. Notable risks has also been observed in these firms such as broken pest control traps, uneven floors, uncontrolled movement of vehicles during entering check weigher, unspecified vehicle parking spaces. As a result of the observations made, it is seen that the risks are in a level which can affect the employees and guests. Employment of security, marking assembly positions, proper storage and positioning of materials and extinguishers, renovation of the floor and specification of parking spaces are suggested as necessary precautions. It is predicted that these measures will reduce the risk levels in lower ranges.

Risks in office section

During the Assessment of risk and hazard sources in the office section in 3 firms, unacceptable risks such as the absence or broken presence of fire extinguishers, emergency fire alarms and absence of emergency exits, disorderly seating arrangement and restricted movement areas are identified. Also notable risks such as cables out in the open, broken air conditioning devices, inadequate lighting, lack of thermal comfort measurements, non-ergonomic equipment are identified. As a result of the observations made, it is seen that the risks are in a level which can affect the employees and guests. Procurement and maintenance of fire extinguishers, installation



of emergency exits and alarms, ensurement of adequate lighting and thermal comfort measures are suggested as necessary precautions. It is predicted that these measures will reduce the risk levels in lower ranges.

Risks in production section

During the Assessment of risk and hazard sources in the production section in 3 firms, unacceptable risks such as the expired fire extinguishers, absence of fire alarms and first aid materials, lack of OHS training in employees, close placement of chemical substances, high noise levels, lack of emergency treatment room are identified. Also it has been determined that there are notable risks such as instruction manuals placement not close to the machines, lack of training, exposed placement of chemical oils, inadequate lighting, materials dropping from shelves. As a result of the observations made, it is seen that the risks are in a level which can affect the employees. Installing fire alarms in necessary positions, proper and separate storage of chemical substances, construction of emergency treatment room and necessary OHS training are suggested as necessary precautions. It is predicted that these measures will reduce the risk levels in lower ranges.

Risks in warehouse section

During the Assessment of risk and hazard sources in the inventory section in 3 firms, unacceptable risks such as the lack of emergency exits, expired fire extinguishers, lack of fire alarms and material information forms, lack of OHS training are identified. Also notable risks such as improper stacking, lack of storage information plate, lack of thermal comfort measures, incomplete personal protective equipment are identified. As a result of the observations made, it is seen that the risks are in a level which can affect the employees. Procurement of material information forms, placement of necessary OHS plates, procurement of personal protective equipment are suggested as necessary precautions. It is predicted that these measures will reduce the risk levels in lower ranges.

Risks in paintshop section

During the Assessment of risk and hazard sources in the paintshop section in 3 firms, unacceptable risks such as the absence of PPEs, exposed placement of paints, lack of ventilation, absence of fire extinguishers, absence of emergency exits, absence of material safety data sheets on chemicals, inward operation of ventilation fans are identified. Also notable risks such as absence of warning signs are identified. As a result of the observations made, it is seen that the risks are in a level which can affect the employees. Procurement of PPEs, proper storage of paints, maintenance of ventilation system and procurement of MSDSs are suggested as precautions. It is predicted that these measures will reduce the risk levels in lower ranges.

Risks in machining production section

During the Assessment of risk and hazard sources in the machining production section in 3 firms, unacceptable risks such as the absence of PPEs, absence of fire extinguishers, incorrect positioning of emergency exits, insufficient protective equipment on machines, absence of instruction manuals of machines, exposed placement of machine oils are identified. Also notable risks such as inadequate lighting and exposed placement of by-products are identified. As a result of the observations made, it is seen that the risks are in a level which can affect the employees. Procurement of machine protection equipment, proper placement of by-products, procurement of instruction manuals are suggested as precautions. It is predicted that these measures will reduce the risk levels in lower ranges.

Risks in welding section

During the Assessment of risk and hazard sources in the welding section in 3 firms, unacceptable risks such as the absence of welding documents, absence of PPEs, absence of fire extinguishers, toxic fumes emitted during welding, incorrect positioning of emergency exits, exposed electric cables are identified. Also notable risks such as absence of warning signs are identified. As a result of the observations made, it is seen that the risks are in a level which can affect the employees. Providing welding training, closed placement of electric cables, installation of fume hood are suggested as precautions. It is predicted that these measures will reduce the risk levels in lower ranges.

Risks in cutting-punching section

During the Assessment of risk and hazard sources in the cutting-punching section in 3 firms, unacceptable risks such as the lack of fire extinguishers, exposed fire extinguishers, lack of machine protection equipments, disorderly placement of materials are identified. Also notable risks such as exposed placement of processed



materials are identified. As a result of the observations made, it is seen that the risks are in a level which can affect the employees. Procurement of protective equipments, proper stacking of materials, procurement and maintenance of fire extinguishers are suggested as precautions. It is predicted that these measures will reduce the risk levels in lower ranges.

Risks in cafeteria section

During the Assessment of risk and hazard sources in the cafeteria section in 3 firms, unacceptable risks such as the absence of PPEs and exposed placement of electric cables are identified. Also notable risks such as lack of hygiene, inadequate lighting, absence of health examination (for infectious diseases), situations caused by electric heater, pests, risks of kitchen utensils are identified. As a result of the observations made, it is seen that the risks are in a level which can affect the employees and guests. Providing hygiene, adequate lighting, ensuring necessary health examinations, pest control are suggested as precautions. It is predicted that these measures will reduce the risk levels in lower ranges.

Risks in welding tube storage section

During the Assessment of risk and hazard sources in the welding tube storage section in 3 firms, notable risks such as disorderly storage, absence of MSDSs of chemicals, transportation vehicles parked close to tubes, expired extinguishers are identified. As a result of the observations made, it is seen that the risks are in a level which can affect the employees. Proper storage, procurement of material information forms, maintenance of fire extinguishers are suggested as precautions. It is predicted that these measures will reduce the risk levels in lower ranges.

Risks in press machine section

During the Assessment of risk and hazard sources in the press machine section in 3 firms, unacceptable risks such as absence of PPEs, absence of emergency alarms and machine protective equipment, high levels of noise and exposed placement of electric cables are identified. As a result of the observations made, it is seen that the risks are in a level which can affect the employees. Procurement and mandatory use of PPEs are suggested as precautions. It is predicted that these measures will reduce the risk levels in lower ranges.

Risks in drilling use

During the Assessment of risk and hazard sources in the drilling use in Firm B and Firm C working conditions are assessed to be very satisfactory. However in Firm A unacceptable risks such as lack of protective equipment on machines and exposed placement of electric cables are identified. As a result of the observations made, it is seen that the risks are in a level which can affect the employees. Procurement of protective equipments, closed placement of electric cables, removal of by-products are suggested as precautions. It is predicted that these measures will reduce the risk levels in lower ranges.

Risks in chain hoist use

In the 3 firms which the risk analysis is carried out, Firm B and Firm C uses chain hoists. During the Assessment of risk and hazard sources in chain hoist use, notable risks such as incorrect material transportation, untrained personnel in material transportation, transportation over the capacity, rope breakage of chain hoist and falling of materials are identified. As a result of the observations made, it is seen that the risks are in a level which can affect the employees. Providing necessary training, paying attention to capacity during transportation are suggested as precautions. It is predicted that these measures will reduce the risk levels in lower ranges.

Risks in forklift use

In the 3 firms which the risk analysis is carried out, Firm B and Firm C uses forklifts. During the Assessment of risk and hazard sources in forklift use, notable risks such as lack of periodic checks, transportation over the capacity, incorrect transportation of materials, absence of licenses, lack of maintenance are identified. As a result of the observations made, it is seen that the risks are in a level which can affect the employees. Implementation of periodic checks, maintenance of forklifts and procurement of licensed forklift user personnel are suggested as precautions. It is predicted that these measures will reduce the risk levels in lower ranges.

5. Conclusion and Suggestions

When the agricultural machinery production firms in Balıkesir are examined regarding occupational health and safety, it has been seen that work accidents cause occupational diseases, injuries and deaths. Due to being a high



level hazard class sector, compared to other sectors this situation must be examined by the experts of occupational health and safety. In Turkey this authority is given to the experts of Occupational Health and Safety. In the agricultural machinery sector, which is a high risk sector due to the reports obtained as a result of the audits, occupational health and safety applications should be implemented and the audits should be increased. If necessary new regulations should be put into practice. With regards to negligence rate, hazards in the sector should be prevented at the source and in the case of hazards that could not be prevented individual protectors should step in. It is aimed to raise the awareness of employers and employees as a result of the periodical inspections in factories which are examined by emphasizing the importance of occupational health and safety and preventing it from being overlooked. When risks in the sectors are examined, manufacturers of agricultural machinery, in particular, must describe the work that is being carried out, inspect if it is being carried out correctly or not and describe the observed work that is not being carried out. Descriptions should be communicated to all employees. The hazards should be prevented by identifying the risks and taking necessary precautions. If the suggestions are implemented, with regards to occupational health and safety, better working conditions will be achieved and occupational diseases and work accidents will be prevented.

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