

# **A new managerial approach to safety at workplace in warehousing systems: A case study**

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## **Abstract**

The existing literature concerning managing safety at workplace consists of papers either analysing the existing safety measures and standards or proposing measures for the enhancement of safety at workplace. On our paper, we propose a new managerial approach which is a solid management standard of work safety administration systems. Moreover, through the case study, an attempt to verify the applicability of the new approach is presented.

**JEL classification numbers:** L81

**Keywords:** management, work safety, approach, warehouse

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## 1 Introduction

A crucial issue in the contemporary search in management science is the management of risks that threaten not only facilities and systems, but also the human resources of an organizational structure. The application range of risk management includes all administrative activities, from supply chain management to financial management [4]. Within this scope we apply a project-based model of risk management, since it is the most modern model in occupational risk management, in warehousing systems. Before we continue in our analysis, however, it is important to define risk. Risk is the exposure to an element or a factor that causes damage [10]. Risk management of warehousing systems has not received equal attention in bibliography compared to that given to risk management of industrial systems. When we focus on warehousing systems we observe that research is concerned with two major risks, the risk of fire [3], [6] and the risk of staff injury [5]. Part of the research has focused on the development of processes for safety management [1], [2], [8]. Researchers are also interested in the development of a corporate culture and working behaviour that promotes safety at work in warehousing systems [3], [13]. Further, the literature includes papers on safety levels, on a territorial level (geographical region) [9] as well as on an industry level (production industries) [11]. Last but not least, on the paper of Panta et al [7] the relationship between safety at work and personnel education is stressed. The article comprises the following parts: the first part, where the reasons that increase the importance of safety at work in warehouses are given; the second part, where the model for risk management concerning employees' safety is presented; and finally, the third part, where suggestions for further research are presented.

## **2 Reasons increasing the importance of safety at work**

During the post-war era, there was an evident change in how businesses were viewed in what concerned human resources. The value of work was shown to be an intangible asset. In this light, the consequent increase of attention of companies to the safety of their employees was reasonable. However, beyond the effect of safety to the morale of employees, safe working conditions have a direct and tangible impact upon the financial operations of the business. More specifically, the increase of safety levels reduces the possibility of working accidents within the warehouse and, therefore, the predictions for compensation payments to employees. If the aforementioned reason focuses on cost reduction, the following reason [12] focuses on revenue increase. Alternatively, businesses with high safety levels, low number of accidents and safety promotion policies in work at the warehouse that have been proved in action, attract investment capital directed towards socially responsible companies that have a consequent increase of their financial revenues.

## **3 Model of risk management**

### **3.1. Risk identification**

The analysis of the standard begins with its first part, which deals with risk identification. This involves the recording of all possible reasons causing damages to employees within the warehousing system. According to Stranks [10] there are three different approaches to the recording of risks. The first concerns the examination of every activity that can cause injury. Such activities are the manually operated pallet picking, cargo lifts, as well as the handling of flammable or explosive and generally dangerous material. The second manner of recording concerns the examination of risks per groups, for example mechanical equipment,

materials handled, transportation means. The third manner of risk identification is directed towards the recording of areas that can be hazardous, such as warehouse departments, warehouse sections or even worksites, for example. The recording process cannot be realized without the participation of employees. As a result, employers have to discuss safety issues with employees as well as any imminent technological change in the warehousing system. The discussion process must work both ways, in the sense that the employee must also be informed by the administration on issues concerning the identification of new risks. Simple discussions with employees in the warehouse comprise an unstructured way of detecting risks. There are, however, structured ways of risk identification. These include risk checklists [4] and personal interviews. Risk checklists are documents about occupational risks in warehouses that have appeared in the past or may appear in the future. Interviews are the second structured way of risk identification. These can be structured, meaning that the interviewee is given a set of questions, or unstructured, meaning that the interviewee is asked to express his opinions on a general question. It must be noted here that even though the interviewing method seems fairly simple, it requires special communication abilities of its conductors, so as to ensure that the interviewee will express his opinions unconstrained, without being “overshadowed” by the look and the presence of the interviewer.

### **3.2. Risk analysis**

The second part of the risk management standard concerns risk analysis. But before we proceed in an analysis of the risks, we should first present the consequences of occupational risks within a warehouse. These are:

- Falling of objects or materials on the floor from a certain height,
- Falling of workers on the ground from a certain height,

- Muscle injuries caused by manual handling of merchandise,
- Injuries caused by use of working equipment,
- Injuries caused by the operation of vehicles in the warehouse,
- Burn injuries caused by fire
- Temporary or permanent injuries due to a high level of noise and frequent vibrations,
- Infections from radioactive and other substances that are harmful to the human organism,
- Harm caused by long-term storage of merchandise,
- Injuries and illnesses caused by poor hygiene, unsuitable lighting, ventilation and temperature,
- Electrocutation caused by poor use of electricity,
- Injury caused by mechanical lifting.

The basic relation in risk analysis is the following:

Level of Risk = (Possibility of appearance) (p) x (Severity) (s) x (Frequency of appearance) (f) [10]

The level of risk constitutes simultaneously an evaluation criterion of the gravity of the risk. The above relation concerns one risk, but if we want to analyze the risks for the totality of the Warehousing system, then we use fault tree analysis. This is graphic representation of the sequence of possible damages of the warehousing system that may lead to harmful conditions for the system under study. The main reason for its use is the easiness of defining the possibility of the risk being realized [4]. In order to complete the risk analysis one must not omit the risk analysis technique which is called job safety analysis [10]. With the above technique every function of the warehouse is examined, as are the related risks and recommended safety measures. It includes the examination of the working spaces, the influences in the working behaviour, the necessary level of training of employees as well as the required level of supervision.

### 3.3 Risk response

The third part of the standard is that of risk response. We discern two kinds of actions on risk response: preventative and corrective actions. Preventative actions focus on handling the causes of the risks. An example of a preventative action is the inspection of all electrical systems and the repair of damages detected in the particular systems of the warehousing area. It is obvious that the above two actions prevent, to a significant degree, the risk of a short circuit that can cause fire. Corrective actions, on the other hand, act upon the consequences that define the importance of the risk. For example, the extinguishing of a fire caused by a short circuit is a corrective action. Further analysis of these two ways of actions for risk response leads to preventative occupational safety strategies in the warehouse and in corrective strategies [10].

Preventative strategies consist of strategies for:

- A safe place

This includes actions for a safe production unit, safe processes within the production unit, adequate supervision, competent and trained staff and safe overall facilities.

- A safe person

This involves actions for the awareness of employees on warehouse dangers and for the care of accident prone employees.

- Safe personal hygiene
- Safe personal safety equipment
- Safe behaviour
- Vigilance concerning risks

In what concerns corrective strategies of risk response, these include:

- Plans for the handling of emergencies
- Feedback processes

- Actions for the improvement of plans for the handling of emergencies

Beyond preventative and corrective measures, however, risk response includes the establishment of procedures for risk response. More specifically, these particular procedures include preliminary actions, such as the preparation of a plan directed specifically towards the special needs of the system. For example, the plan drawn out if the warehouse is situated within an urban zone will be different from the plan drawn out if the warehouse is situated in an industrial zone. Moreover, preliminary procedures of plans for risk response include the familiarization of all employees with risk response through training. Other preliminary actions include the training of safety staff and the adoption of programmes for regular examination of the sources of risk, as these have been defined during the stage of risk analysis. Beyond these preliminary measures, appropriate procedures should be developed for a risk response plan, so that employees will be notified for the coming of imminent danger. All alarm and notification systems are included. Continuing with risk response plans we come across actions for response to the consequences of risk, when risk is manifested. Examples of such actions are the use of the fire extinguishing means of the warehousing system, the use of individual means for the rendering of first aid services and the notification of first aid systems such as the National Instant Aid Centre. The final type of action includes actions during the crisis termination, such as the recording of injuries, material damages and causes that led to the risk being manifested. Crucial points in risk response plans are the coordination of response actions, the public relations of the company and, of course, the training of employees for situations of crisis. The above data is documented by Ramsey [8]. He presents the objective aim of crisis management, which is “to prevent an emergency becoming a crisis and to prevent a crisis becoming a disaster”. The public relations of the organisation and more specifically the management of communication with the local communities and other interested parties through the Mass Media are also an important success factor of risk management plans.

### 3.4 Risk monitoring

The final part of the standard includes risk monitoring, that is the monitoring of corrective actions implementation for risk response and for the detection of new risks through the procedures developed in the first part of the standard. Practical ways of risk monitoring are the following:

- Safety Inspections

This is a regular observation technique with the main purpose of minimizing risk manifestation. Checks are formed according to the administration policy, the behaviour of employees, the staff training level and the procedure characteristics. The following have to be designed based on the experience of previous accidents:

- Safety Surveys

These comprise the detailed examination of a number of crucial parameters of warehousing, such as the safety of procedures and operations of manual merchandise handling. The result of the inspection is the safety inspection report, which aims at demonstrating all of the shortcomings of the existing system of occupational risk management.

- Safety tours

These are unscheduled inspections of working areas for the examination of issues on safety and hygiene and levels of cleanliness. Their purpose should be the support of decisions for the safety of the lower levels of administration hierarchy and the examination of all incidents that damaged the warehousing system. The procedure of risk monitoring constitutes the basis of safety procedure management standards [1]. With CCPS being the main standard, coming from chemical industry, there is the possibility of constant improvement of performance of safety procedures through the adoption of regular procedures or through changes in safety processes.

## **4 Case study**

The final part of this paper presents the case study of a bottling company in the Viotia prefecture, where the company keeps warehousing facilities. The company is certified according to the OHSAS 18.000 standard, and has a Risk Assessment Study (RAS). In the first part of the standard, the risk detection, the company has the RAS as a main criterion for the identification of risks and risk factors. In the context of the RAS, the safety technician is entrusted with the role of inspecting the warehousing system with tests on the spot and checking it in comparison with the factors that led to the accident occurrence. Apart from the RAS, the company has adopted the “nearly accident” procedure, which is a risk prediction system. The aim of the procedure is to detect working practices that can cause accidents, even if these practices have not caused any accidents. The “nearly accident” procedure includes any absences from work due to illness that last more than one day. The result of this is an index that offers safer conclusions on the level of working safety and hygiene, according to the company. The process of safety data exchange with employees mainly includes interviews with employees. Information transmission about new risks is also achieved through the HYGIENE & SAFETY Committee, comprised solely of employees. It is worth mentioning that the company has adopted a company culture which encourages the direct and voluntary report of a risk from the employees in the warehouse to the warehouse administration.

In the second part of the standard, the risk analysis, the company has included the Job Safety Analysis in the RAS. The RAS is a dynamic system where the main outcome is a rating resulting from factor evaluation: days of absence due to injury, number of fatal accidents, possibility of accident occurrences, and impact on the company’s function. It is obvious that the rating is based on the formula presented in chapter 2.2. As regards the encouragement of new employees to study safety instructions, the company submits, without exceptions, all newly hired employees to an introductory training programme, focusing on studying safety instructions to

a greater extent. Moreover, the company has a staff selection strategy which is based on the hiring of forklift operators that are certified or are going to be certified by a government agency (assistants belonging to on the job training programmes that lead to certification).

In the third part of the standard, the risk response, we observe that preventative measures derive from legal obligations as well as from the RAS. In the first category, the category of legal obligations, preventative measures are the installation of a horn and beacon on forklifts and a special phosphorescent vest for pedestrian workers and for forklift operators. In the second category, the following preventative measures are included: a) the movement of forklifts on exclusive routes, b) the use of mirrors on forklifts and c) the designation of parking spots for incoming and outgoing trucks for the avoidance of collisions. The emergency management standard is a written instruction including all necessary actions as these are defined in the RAS. The educational programme for crisis management includes simulation activities for fire in cooperation with the Fire Department and seminars on first aid by the Red Cross. Simulation exercises for fire are realized every two years. There is certification granted for the first aid seminars. It is worth mentioning at this point that on every shift in the warehouse there is an employee that has first aid certification.

In the last part of the standard, that of risk monitoring, we observe that inspections are realized on a monthly basis, with the aid of a check list from the safety technician. The inspected sectors are a) human resources and personnel behaviour, b) mechanical equipment and c) infrastructure, buildings. The safety standard is not revised at regular intervals but according to resultant needs, such as a new regulation or the introduction of a new packaging handled in the warehouse. Finally, the company keeps an incident record for the entire factory but not separately for the warehouse. It is the company's legal obligation to compile the incident report and the consequences report.

## 5 Conclusion and further study

In this paper we discussed a project-based standard of risk management for work accidents in warehousing areas, thus contributing through this paper to the research in the areas of safety at work and in administration. More specifically, we examined the reasons that increase the importance of safety at work and then we analyzed the four parts of the standard (risk identification, risk analysis, risk response, risk monitoring). Further study could be directed towards the examination of working accidents for the totality of supply chain operations.

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