

## OCCUPATIONAL SAFETY MANAGEMENT IN THE LIGHT OF CAUSES ANALYSIS OF ACCIDENTS

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**Abstract:** Management processes play the key role in providing for health and safe conditions of work and managers play the most important role in counteracting accidents at work. This article discusses some basic problems related to inappropriate organisation of work as a cause of accidents in the overall national economy, in the Industrial Processing section, and in the particular processing departments in years 2006-2011. It was found out that inappropriate organisation of work was an especially significant cause in case of serious and fatal accidents. In many departments of Industrial Processing section, it was even pointed out twice more often, as a reason for serious and fatal accidents, than total accidents.

**Key words:** occupational safety management, accidents, causes

### Introduction

A human being is both the subject and the object of interactions within the occupational health and safety management system, as it is not possible for the company to be managed and operated without participation of its employees upon all operational levels, while at the same time the performance of work processes may be connected with various accident- and/or illness-related hazards.

Management processes, such as: planning, organising, motivating and controlling, when referred to concrete actions that are unique for the occupational health and safety area, covering primarily identification of hazards and occupational risk assessment, monitoring conditions of work, corrective and preventive actions, internal communication and training programmes [11], play the key role in providing for health and safe conditions of work. Due to the fact that it is high ranking managers who are responsible for the effective and successful performance of management processes [2], it can be assumed that managers play the most important role in counteracting accidents at work. It is the managers who are responsible both for hazards that occur in work processes and for reasons that cause accidents. This results from the fact that it is managers who are responsible for selection of technologies, methods and manners of work, selection of employees in terms of their physical and psychological characteristics, selection and availability of means of protection against hazards, and many other actions.

### Causes of accidents related to managerial errors

An error is each action or omission, which could cause or provoke an accident-related event, hazard occurrence, error committed by an employee, or hazardous

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conditions of work. Managerial errors can be caused by negligence (managers knowing what to do, but failing to do so) or overlooking (managers failing to notice what should have been done). Most frequently, managers' errors do not disclose themselves just before the accident happens, as direct reasons; in fact they are very often quite distant in time from the accident-related event, hence there occurs a tendency to underestimate their actual impact. While analysing accident-related events from the standpoint of identifying the basic and systemic reasons, which actually serve as a basis to select effective preventive actions, it is practically always possible to identify reasons related to errors committed by managers.

Within the literature of the subject, seven typical recurring areas are indicated, in which managers commit errors most frequently, including [4]: equipment failure, wrong machinery maintenance procedures, employer's objectives conflicting with work safety requirements, organisational errors, errors in communication, improper training, and inadequate safety devices.

Most frequently, errors committed by employees result from managers' negligence or oversight in, inter alia, such areas as: machinery maintenance, organisational scheme of the company or its part (including work stands), work instructions, conditions of work, setting objectives, personnel communication, training programmes, personal and collective protection means. In principle, these errors actually encumber high-level managers rather than direct ones, as it is not them who are responsible for systemic solutions.

Table 1 lists statistics of reasons for accidents according to traditional assessments and according to the MORT method.

**Table 1. Statistics of reasons for accidents**

<b>Statistic of accidents causes according to traditional assessments - OSHA*</b>		
Accidents resulting from...	hazardous behaviour of an employee	<b>85 %</b>
	hazardous conditions	<b>15 %</b>
<b>Statistic of accidents causes according to the MORT Method**</b>		
Accidents resulting from...	supervisory errors	<b>24.7 %</b>
	errors made by engineering / maintenance teams	<b>18.4 %</b>
	errors made by work health and safety teams	<b>15.6 %</b>
	errors made by victims	<b>14.8 %</b>
	errors made by victims' peers	<b>13.7 %</b>
	errors made by managers	<b>12.8 %</b>
*OSHA – <i>Occupational Safety &amp; Health Administration</i>		
**MORT – <i>Management Oversight and Risk Tree</i>		

*Source: Author's elaboration based on [4]*

On the other hand, one of direct managers' most significant duties is their ability to detect situations that foster errors being made by their workers, and their skill to eliminate such situations. Hence, it is important for direct managers to know how

human beings function, what errors they tend to make and why, and how they behave when faced by hazards. Such knowledge makes it possible for direct managers to predict much better if, by any chance, a given work or task being carried out by an employee does not provoke him to commit an error, i.e. if it does not create an accident-related situation.

Significance of the quality of management processes for the efficiency of actions taken in the work health and safety area, in the context of errors committed by managers, is primarily mirrored in provisions of normative documents concerning work health and safety systems, such as: ILO-OSH 2001 [3] (Area “Organising” that covers: 3.3. Responsibilities and scope of competences, 3.4. Qualifications and training programmes, 3.5. Documentation of the work health and safety management system and 3.6. Personnel communication), OHSAS 18001 [7] (Area 4.4.2. Training, awareness and competences, 4.4.3. Consultancy and communication, 4.3.4. Work health and safety management programmes) or PN-N-18001:2004 [8] (Area 4.4.3. Training, awareness, competences and motivation, and 4.4.4. Personnel communication), as well as in concepts of work health and safety management assessment methods.

The most widely known example of a method used to assess work health and safety management areas is ISRS (International Safety Rating System) [5], within the frameworks of which 20 areas of management are reviewed and assessed, including the “Management and administration” area. The high significance of this area is emphasised by the fact that it comprises the highest possible number of questions (74), for which it is possible to obtain the highest possible score (1310). This area is mandatory, irrespective of the level of analysis and the adopted area assessment approach.

### **Research methodology**

The basic objective of this study was to analyse accidents from the standpoint of identifying reasons related to errors in work health and safety management processes. Therefore, the share of inappropriate organisation of work in reasons for accidents at work was studied in the overall economy, in the Industrial Processing section, and in the particular departments of this section, taking into account results of accidents (serious accident, fatal accident).

In this study, we focused upon years 2006-2011 [12]. For research purposes, we made use of statistical data gathered and published by the Central Statistical Office [GUS] based upon the Statistical Card for Accidents at Work, whose compiling and filing manners were regulated in the provisions of Ordinances of 8 December 2004 [9] and of 7 January 2009 [10] upon the Statistical Card for Accidents at Work at work.

This analysis comprised data concerning reasons for accidents at work in compliance with the accident investigating model adopted by GUS for its Statistical Card for Accidents at Work. This model is based upon the so called statistical accident model introduced by EUROSTAT. The way the form of the Z-

KW Statistical Card for Accidents at Work has been designed makes it possible to indicate up to seven reasons for accident among eight categories.

In performing a statistical analysis, it must be taken into account that for the eight categories of reasons, as many as five refer to various kinds of irregularities in tasks being performed by employees. This exerts some influence upon the way reasons for accidents at work are recorded, and upon results of statistical analyses [11].

Due to the changes that have been made to the classification of businesses, which initiated a new division in the Industrial Processing section, analysis within the particular departments was carried out separately for years 2006-2008 and for years 2009-2011.

### **Organisational work safety problems in the overall economy and in the Industrial Processing section**

#### Inappropriate organisation of work among other categories of reasons for accidents

Causes of accidents at work cover all kinds of shortages and irregularities, which have, directly (direct reasons) or indirectly (basic reasons), contributed to the occurrence of an accident connected with material factors (machinery, tools, etc.), with the organisation of work (organisation of work in general or organisation of the particular work stand), and connected with the employee.

Table 2 lists the categories of reasons for accidents, which are mentioned in the explanations on how to fill in the Statistical Card for Accidents at Work.

**Table 2. Classification of accidents causes as used in the Statistical Card for Accidents at Work**

Classification of accidents causes	
<b>R1</b>	Inappropriate condition of material agent
<b>R2</b>	Inappropriate organization of work
<b>R3</b>	Inappropriate organization of workplace
<b>R4</b>	Absence or inappropriate use of the material agent
<b>R5</b>	Not using protective equipment
<b>R6</b>	Inappropriate willful employee action
<b>R7</b>	Inappropriate mental – physical condition of employee
<b>R8</b>	Incorrect employee action
<b>R9</b>	Other

*Source: Author's elaboration based on [10].*

Among the eight categories of accidents causes as mentioned in the Statistical Card for Accidents at Work, the following reasons have been included within the reasons associated with inappropriate organisation of work within a company:

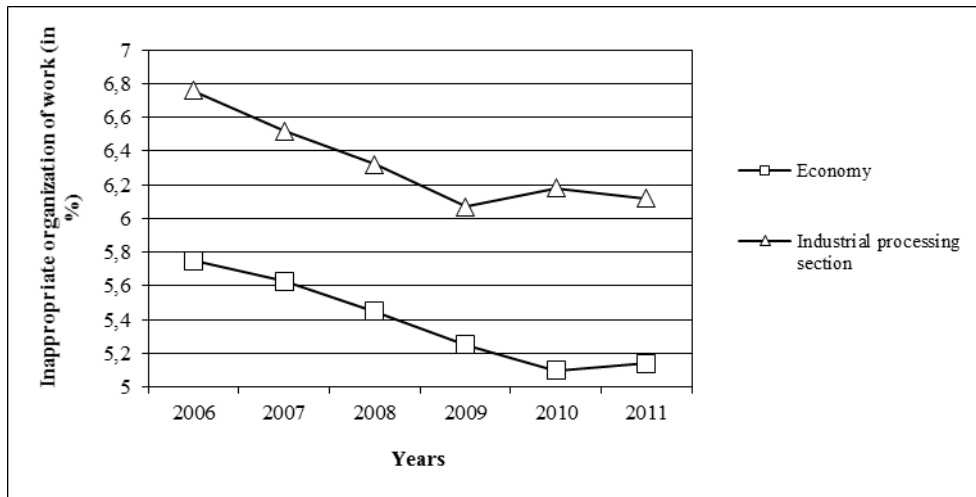
- inappropriate division of work or task assignment,
- improper commands issued by superiors,

- lack of supervision,
- inappropriate coordination of collective works,
- performing, at supervisors' request, works that do not fall within a given employee's scope of responsibilities,
- lack of instructions on how to use material factors,
- allowing material factors (machinery, tools) to be operated or used without inspections and releasing documents required for them,
- managers tolerating infringements of work health and safety rules and regulations
- insufficient occupational preparedness of the employee,
- lack of or inaccurate work health and safety training,
- managers tolerating making use of inappropriate technology,
- allowing employees to work with medical counter indications or without medical examinations,
- performing the work despite insufficient number of personnel,
- performing the work despite insufficient provision of equipment, raw materials, etc.

#### **Inappropriate organisation of work as a cause of accidents at work in the overall economy and in the Industrial Processing section**

What follows from our analysis is that over the studied years 2006-2011, in the economy as a whole, inappropriate general organisation of work was responsible on the average for 5.39 % of causes of accidents at work, whereas the share of reasons in this category kept falling – from 5.75 % in 2006 to 5.14 % in 2011 – Figure 1.

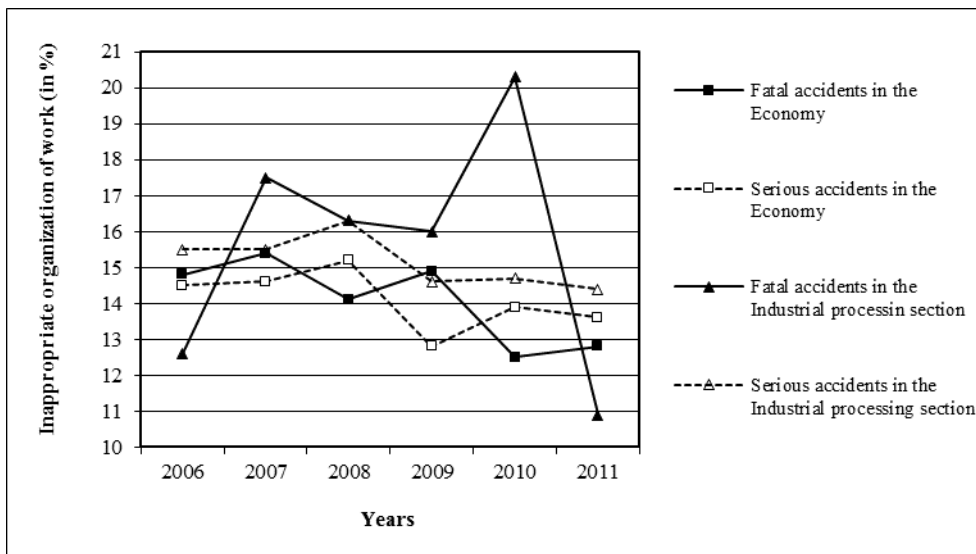
At the same time, in the Industrial Processing section, inappropriate general organisation of work was responsible on the average for 6.33 % of reasons for accidents at work. And also in this case, a fall was observed in the share of inappropriate general organisation of work from 6.76 % in 2006 to 6.12 % in 2011.



**Figure 1. Inappropriate organization of work as a cause of accidents in total in the overall economy and in the Industrial Processing (in %)**

*Source: Author's elaboration based on [12].*

On the other hand, despite the overall falling tendency we observed in the share of reasons for accidents at work related to inappropriate organisation of work in the economy as a whole, in the Industrial Processing section, in years 2006-2010, there occurred a significant increase in the share of this group of causes of fatal accidents – from 12.58 % in 2006 to 20.30 % in 2010 – Figure 2.



**Figure 2. Inappropriate organization of work as a cause of fatal and serious accidents in the overall economy and in the Industrial Processing (in %)**

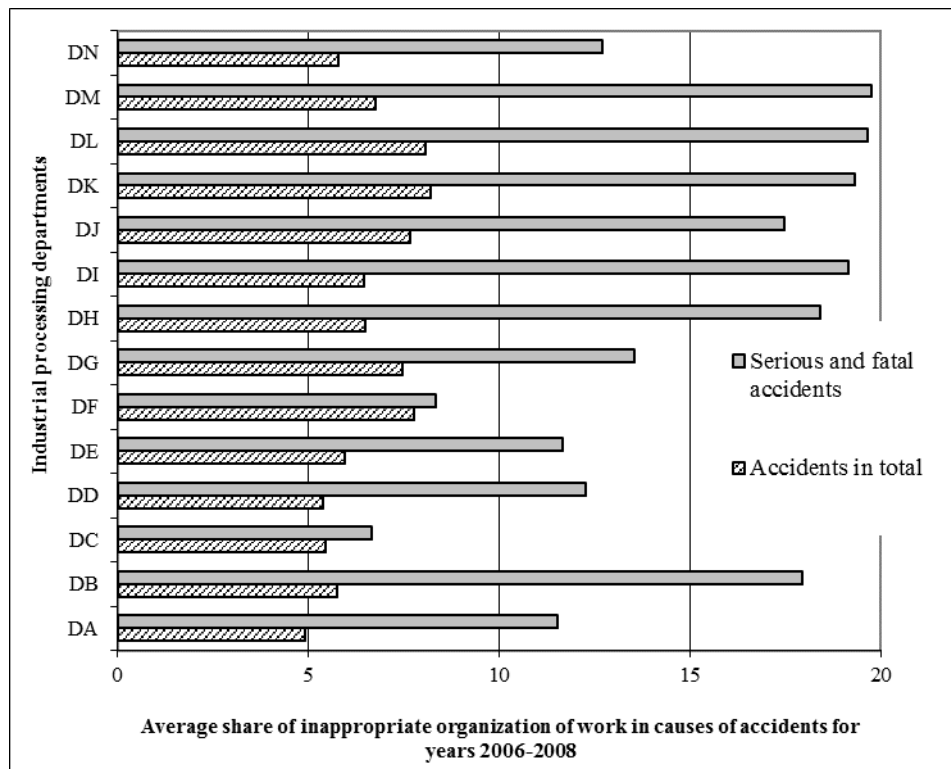
*Source: Author's elaboration based on [12].*

### **Inappropriate organisation of work as a reason for accidents at work in the particular industrial processing departments**

Analysis of the share of inappropriate organisation of work in total reasons for accidents and serious and fatal accidents in the particular industrial processing departments was carried out separately and for years 2006-2008 – Figure 3 and for years 2009-2011 – Figure 4.

Irrespective of the period of time that was studied, inappropriate organisation of work was an especially significant reason in case of serious and fatal accidents. In many departments, it was even pointed out twice more often, as a reason for serious and fatal accidents, than total accidents.

What follows from our analysis is that over the studied years 2006-2008, the department of production of foodstuffs, beverages and food products (DA) had the lowest average share of inappropriate organisation of work as total reasons for accidents – 4.91 %, whereas the department of machinery production not classified elsewhere (DK) – had the highest one – 8.21 % – Figure 3. At the same time, the tanned leather and tanned leather products manufacturing department (DC) had the lowest average share of inappropriate organisation of work as a reason for serious and fatal accidents – 6.67 %, whereas the transport equipment manufacturing department (DM) – had the highest one – 19.76 %. Furthermore, the department of production of coke, refined petroleum products and nuclear fuel (DF) had the lowest difference between the shares of inappropriate organisation of work in serious and fatal accidents and in total accidents – 0.57 %, whereas the transport equipment manufacturing department – had the highest one – 12.99 %.



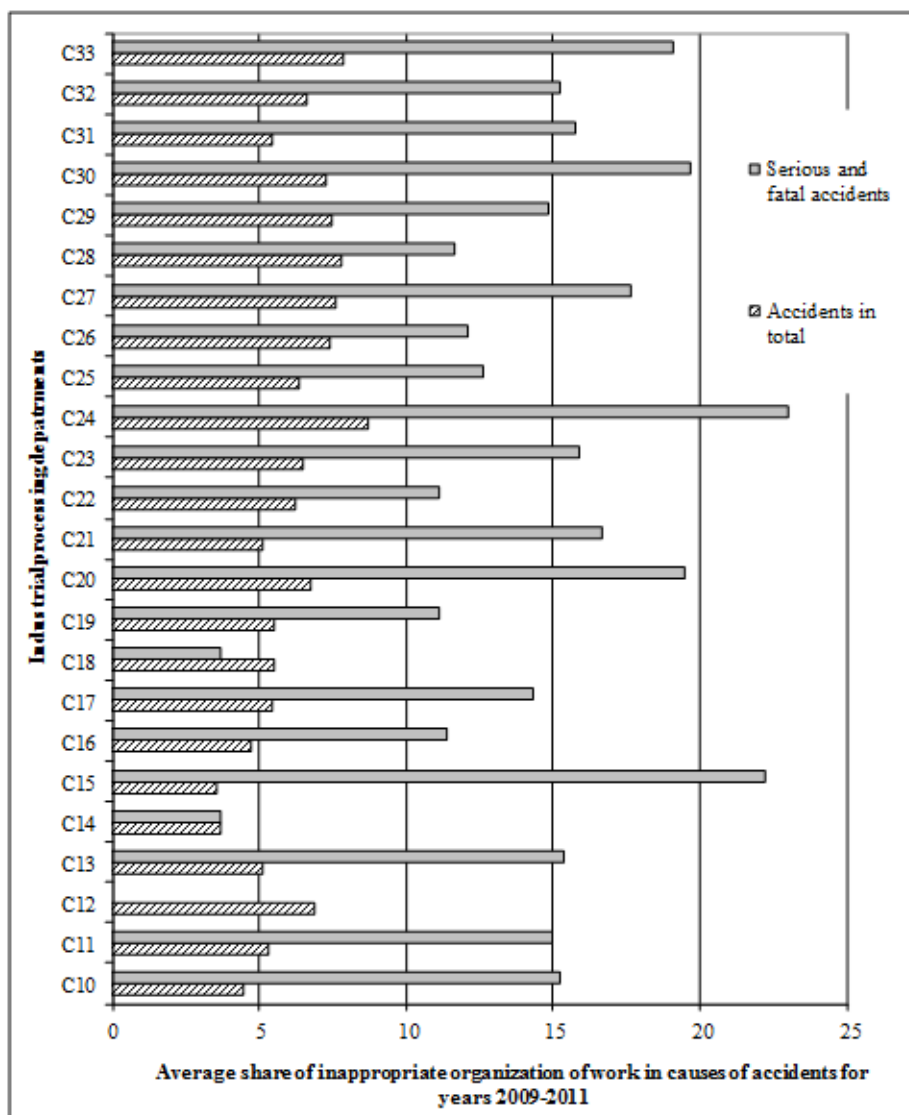
Manufacturing: DA- of food products; beverages and tobacco, DB- of textiles and textile products, DC- of leather and leather products, DD- of wood and wood products, DE- of pulp, paper and paper products, publishing and printing, DF- of coke, refined petroleum products and nuclear fuel, DG- of chemicals, chemical products, DH- of rubber and plastic products, DI- of other non-metallic mineral products, DJ- of basic metals and fabricated metal products, DK- of machinery and equipment n.e.c., DL- of electrical and optical equipment, DM- of transport equipment, DN- manufacturing n.e.c.

**Figure 3. Inappropriate organization of work as a cause of accidents at work in the particular industrial processing departments in years 2006-2008 (in %)**

*Source: Author's elaboration based on [12].*

On the other hand, in years 2009-2011, the lowest average share of inappropriate organisation of work as total reasons for accidents was observed in the tanned leather and tanned leather product manufacturing department (C15) – 3.53 %, while the highest one – 8.71 % was observed in the metal production department (C24) – Figure 4. At the same time, the tobacco products manufacturing department (C12) had the lowest average share of inappropriate organisation of work as a reason for serious and fatal accidents – 0 %, whereas the metal production departments (C24) – had the highest one – 22.98 %.





Manufacturing: C10- of food products, C11- of beverages, C12- of tobacco products, C13- of textiles, C14- of wearing apparel, C15- of leather and related products, C16- of wood and cork products except furniture; manufacture of articles of straw and plaiting materials, C17- of paper and paper products, C18- printing and reproduction of recorded media, C19- of coke and refined petroleum products, C20- of chemicals and chemical products, C21- of basic pharmaceutical products and pharmaceutical preparations, C22- of rubber and plastic products, C23- of other non-metallic mineral products, C24- of basic metals, C25- of fabricated metal products, except machinery and equipment C26- of computer, electronic and optical products, C27- of electrical equipment, C28- of machinery and equipment n.e.c., C29- of motor vehicles, trailers and semi-trailers, C30-, of other transport equipment, C31- of furniture, C32- other manufacturing n.e.c., C33- repair and installation of machinery and equipment.

**Figure 4. Inappropriate organization of work as a cause of accidents at work in the particular industrial processing departments in years 2009-2011 (in %)**

*Source: Author's elaboration based on [12].*

Furthermore, the tanned leather and tanned leather products manufacturing department (C15) had the highest difference between the shares of inappropriate organisation of work in serious and fatal accidents and in total accidents – 18.68 %, whereas in case of departments manufacturing of tobacco products (C12) and printing and reproduction of recorded information carriers (C18) there occurred a reverse relation – the share of inappropriate organisation of work was higher in the case of total accidents than in the case of serious and fatal accidents.

### Summary

Managers' errors affect their employees' conditions of work and the operations they perform; therefore one may say that their errors affect errors being committed by their employees. Some of the basic reasons for accidents at work, which employees suffer through the fault of their managers, include: wrongly communicated tasks, creating error-encouraging situations, wrong selection of employees, lack of accurate training programmes, infringements on safe work principles being tolerated by direct managers, and inappropriately or ineffectively motivating employees to perform their work in a safe manner.

In line with the MORT concept [5], the accident is always preceded by a series of planning errors and operational and organisational errors that result in the employee being not adjusted towards environmental or social conditions. In other words, it is not the employee who is guilty of an accident, but the situation in which he found himself and which provoked him to commit the error, including broadly comprehended work environment that comprises, besides physical / material elements, also some psychological aspects, such as: managing employees, atmosphere at work, personal relations, etc.

The basic objective of our studies was to analyse accidents from the standpoint of identification of reasons related to errors in the work health and safety management process, as it is routine actions taken every day by the managerial staff that have the most fundamental significance in preventing accidents at work.

As a result of our statistical data review, we observed that over the studied years 2006-2011, inappropriate general organisation of work was responsible on the average for 5.5 % of reasons for accidents at work in the overall economy and 6.5 % of reasons for accidents at work in industrial processing, whereas in case of fatal accidents, it was respectively: 14.2 % in the overall economy and 16.4 % in the processing branch.

Furthermore, it was found out that the share of inappropriate general organisation of work in total reasons for accidents in the overall economy fell in years 2006-2011 by almost 1%, whereas it significantly increased in reasons for fatal accidents, in industrial processing – by almost 5%. At the same time, the share of inappropriate organisation of work in total reasons for accidents and serious and fatal accidents was highly variable within the frameworks of industrial processing – Table 3.

**Table 3. Line-up of industrial processing departments from the standpoint of share of inappropriate organisation of work in causes of accidents in years 2006-2011**

Share of inappropriate organisation of work in causes of accidents																								
	MIN-----MAX																							
2006-2008																								
WO	DA	DD	DC	DB	DN	DE	DI	DH	DM	DH	DJ	DF	DL	DK										
WCS	DC	DF	DA	DE	DD	DN	DG	DJ	DB	DH	DI	DK	DL	DM										
R	DF	DC	DE	DG	DA	DD	DN	DJ	DK	DL	DH	DB	DI	DM										
2009-2011																								
WO	C15	C14	C10	C16	C13	C21	C11	C17	C31	C18	C19	C22	C25	C23	C32	C20	C12	C30	C26	C29	C27	C28	C33	C24
WCS	C12	C14	C18	C22	C19	C16	C28	C26	C25	C17	C29	C11	C10	C32	C13	C31	C23	C21	C27	C33	C20	C30	C15	C24
R	C12	C18	C14	C28	C26	C22	C19	C25	C16	C29	C32	C17	C23	C11	C27	C13	C31	C10	C33	C21	C30	C20	C24	C15
Description of departments D – as per Figure 3																								
Description of departments C – as per Figure 4																								
WO – share in causes of accidents in total																								
WCS – share in causes for serious and fatal accidents																								
R – difference between the shares in accidents of serious and fatal accidents and total accidents																								

Source: Author's elaboration

Thus, it can be assumed that organisational factors play varying roles in various industrial processing departments. On the other hand, it is important that inappropriate organisation of work, i.e. managerial errors, were mainly pointed out with reference to serious and fatal accidents, i.e. accidents with higher degree of recordability. Hence, it may be presumed that this problem is also significant in the context of less serious accidents and other potential accident-related events.

Identification of reasons for accidents is the first step towards limiting the risk level of accidents, which result from similar reasons, occurring in future [1]. It is also helpful in evaluating safety requirements and principles as stipulated in various kinds of rules and regulations at various levels of the economy, section or department. Recognising and understanding the nature of errors being committed by managers may be of crucial significance in building effective work health and safety management systems. Therefore, our analysis as discussed in this article is fully justified in practice.

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## ZARZĄDZANIE BEZPIECZEŃSTWEM PRACY W ŚWIETLE ANALIZY PRZYCZYŃ WYPADKÓW

**Streszczenie:** Procesy zarządzają odgrywają kluczową rolę w zapewnieniu bezpiecznych i higienicznych warunków pracy a zarządzający odgrywają najważniejszą rolę w przeciwdziałaniu wypadkom przy pracy. W artykule omówiono podstawowe problemy związane z niewłaściwą organizacją pracy jako przyczyną wypadków w gospodarce narodowej, w sekcji Przetwórstwo przemysłowe oraz w poszczególnych działach przetwórstwa w latach 2006-2011. Stwierdzono, że niewłaściwa organizacja pracy jest przyczyną szczególnie istotną w przypadku wypadków ciężkich i śmiertelnych. W wielu działach Przetwórstwa przemysłowego wskazywana jest nawet dwukrotnie częściej jako przyczyna wypadków ciężkich i śmiertelnych niż wypadków ogółem.

**Słowa kluczowe:** zarządzanie bezpieczeństwem pracy, wypadki, przyczyny wypadków

### 鑑於職業安全管理導致事故分析

**摘要：**在提供健康和安全的工作條件，和管理人員，管理過程中發揮的關鍵作用發揮最重要的作用，抵消在工作中發生意外。本文討論了組織工作不當有關國民經濟總體事故的原因，一些基本的問題，在工業加工部分，特別是處理部門在2006-2011年。它被發現不恰當的組織工作是一個嚴重和致命事故的情況下尤其顯著的原因。在許多工業部門處理部分，它甚至指出兩次，更多的時候，作為一個嚴重和致命事故的原因，事故總量比。