

# STUDIA I MONOGRAFIE

z. 275

**Iwona Mulicka**

## WORK CONDITIONS IN ECONOMY AND INDUSTRY OF OPOLE PROVINCE



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## CONTENTS

|   |           |
|---|-----------|
| Introduction .....  | 5         |
| <b>1. Chapter</b>   |           |
| <b>Characteristics of economy, industry and work conditions in Opole province .....</b>                                   | <b>7</b>  |
| 1.1. Characteristics of industry in Opole province .....  | 7         |
| 1.2. Analysis of work conditions in work safety context .....   | 9         |
| 1.3. Statistical analysis of work conditions in economy and industry in Opole province during transformation period ..... | 10        |
| 1.3.1. Work safety and scale of harmful conditions threat in the industry .....   | 12        |
| 1.3.1.1. Work conditions in selected industry branches .....  | 17        |
| <b>2. Chapter</b>   |           |
| <b>Occupational diseases and accidents at work in Opole province' .....</b>   | <b>27</b> |
| 2.1. Occupational diseases as a result of threats present in work environment .....                                       | 27        |
| 2.2. Work accidents in economy and industry .....   | 29        |
| <b>3. Chapter</b>   |           |
| <b>Noise as a dominant health threat.....</b>   | <b>37</b> |
| 3.1. Noise influence on human organism .....  | 37        |
| 3.2. Evaluation of noise threat in national economy .....   | 41        |
| 3.3. Evaluation of noise threat in Opole province .....   | 43        |
| 3.3.1. Noise threat in industry and its branches in years 1985 – 1994... ..   | 43        |
| 3.3.2. Noise threat in selected industry works in years 1995 – 1999.....  | 45        |
| 3.3.3. Noise threat in selected industry branches.....  | 47        |
| 3.4. Society's knowledge concerning noise as a dangerous factor and its influence on human health .....                   | 49        |
| <b>4. Chapter</b>   |           |
| <b>Health threats caused by work conditions in opinion of various profession workers .....</b>                            | <b>57</b> |
| 4.1. Work safety and health threats in medical services.....  | 57        |
| 4.2. Consequences of work safety threats in teachers profession.....  | 62        |

|  |           |
|--|-----------|
| 4.3. Work safety threats connected with trademen profession .....  | 66        |
| 4.4. Work safety threats in firemen profession .....   | 69        |
| <b>5. Chapter</b>  |           |
| <b>Industry workers subjective evaluation of work safety<br/>and conditions in Opole province.....</b>   | <b>73</b> |
| 5.1. Work safety and work social environment .....   | 73        |
| 5.2. Work safety and material work environment .....   | 82        |
| <b>6. Chapter</b>  |           |
| <b>Work safety and protection as elements of state social policy.....</b>                                | <b>87</b> |
| 6.1. Social policy strategy in the 90's of XX century.....   | 87        |
| 6.1.1. Social policy subject of interest.....  | 88        |
| 6.2. Work safety and protection in legal system in the beginnings<br>of transformation period .....      | 90        |
| 6.3. Work safety and protection in legal system after Poland accessed the<br>European Union (2004) ..... | 91        |
| 6.3.1. Work safety managing system.....  | 93        |
| Summary .....  | 97        |
| References .....   | 99        |
| Dissertation abstract .....  | 105       |

## INTRODUCTION

Dissertation goal is to present work conditions in economy and industry of Opole province in the period of system transformation. The background of the work conditions are social consequences of changes in work conditions.

Coming out of political and economic crisis of the 80's was equivalent with introducing slow changes in socialistic economy (years 1982 – 1988). This situation was characterized with lack of goods on the market and the hyperinflation phenomena. Slow changes, including admitting foreign capital, did not bring expected fast results though the industrial production slightly increased (in 1988 it exceeded the level from year 1980 of 13,2%) as well as domestic product (13,3% higher in 1988 comparing to year 1980) [82].

Year 1989 in Poland finished the period of political changes resulting in both Round Table talks and free general election. Division of power between ruling coalition and opposition was a signal for introducing structural changes in national economy and politics. Poland is stated to have the most difficult starting point situation among all former post communist countries because of macro economic imbalance and strong position of labour unions who were able to extort a concessions. During the time of Cabinet of T. Mazowiecki a model of economic transformation also called as “shock therapy” was introduced. In spite of difficulties in first years of transformation period, it proved to bring a positive economic results (between 1990 – 1997 Poland noted the highest GDP dynamics) [80].

First phase of transformation was to stabilize and liberate the economy, it was introduced against general condemnation. It created grounds for building a new law and institutional system meeting requirements of market economy. The ground for creating a market economy was privatization and serious changes in economy development, which is economy restructuring. The period of structural changes in Poland has not finished yet, however its positive result was proven by Poland accessing EU in 2004. While undergoing crucial economic changes aiming at consolidating market economy; grounds of its functioning – work conditions of workers employed mainly in Polish industry, became an important issue. Only work safety, guaranteed by proper social policy could bring in this restless period an expected results such as improvement of work efficiency and quality.

Hence, presented dissertation analyses data referring to work conditions as well as in Opole province, which constitutes the reflection of extensive processes and changes undergoing in Polish economy.

Dissertation uses such health threat indicators as harmful factors, number of accidents at work or number of occupational diseases cases.

Harmful work conditions and their results in Opole province are the main issue of first chapter. Statistical analysis of health threatening conditions shows effects of definite social politics influencing the population employed in economy and industry. Analysis results present changes related to critical year 1989 as well as changes during economic transformation period up to year 2003 right before Poland accessed European Union.

The second chapter presents occupational diseases as a result of threats present in work environment and statistical analysis of work accidents in economy and industry in Opole province.

Chapter three presents the problem of noise, a major threat present in industry. To emphasize a negative influence of this factor on human health, short characteristics of noise, its influence on workers' health and negative health consequences such as occupational diseases related to hearing loss have been presented. Results of questionnaire research conducted among primary and gymnasium schools students have been presented, they referred to their awareness of noise sources and health threats caused by this factor.

Chapter four presents questionnaire research results conducted among selected professions such as medical personnel and teachers as well as merchants and fire brigade workers. Main goal of the research was obtaining information about workers opinion referring to their estimation of their work conditions and on the other hand – actual safety estimation.

Fifth chapter presents research results of workers' subjective estimation of social and material work conditions in context of threats and consequences for individual's health. Estimation was conducted in different economic units employing various numbers of workers.

The last chapter presents a direction of improvements introduced in labour law and ways to improve and update Labour Code regulations. Moreover, changes in state social policy as a result of system transformations after year 1989 are presented.

Analysis of state social policy was conducted within the work safety area in relation to work conditions during system transformation period in Poland. Transformation significantly changed stagnant political, economic and social structures. Changes in law system followed mentioned changes. Social policy should implement such tasks as protecting the society, satisfying existential needs of poorer part of society suffering from unemployment or unable to satisfy their basic needs.

Dissertation presents the whole spectrum of factors directly influencing work conditions in difficult transformation period. The analysis of selected aspects of work conditions in economy and industry allowed to estimate changes in examined period and showed the priority role of state social policy. Summary presents results of long term researches relating to work conditions in economy and various industry branches.

## Chapter 1

### CHARACTERISTICS OF ECONOMY, INDUSTRY AND WORK CONDITIONS IN OPOLE PROVINCE

Province of Opole has been created in 1950 and although many territorial reforms and changes in the number of provinces underwent, it did not change its name, however its territory area has been changing few times. To characterise that province, we can state that good quality soils has been conducive to agriculture development especially in southern part and mineral resources have been useful in building and industry development [50].

#### 1.1. Characteristics of industry in Opole province

Opole province industry concentrated among urban centres like Opole, Brzeg, Nysa, Prudnik, Kluczbork. Industry works, around small urban centres have constituted for half of century a back for the workforce for the closest area, decided about region's specific. Works in Ozimek, Works in Zawadzkie, Coking Plant in Zdieszowice, "Frotex" in Prudnik, Paper Works in Krapkowice and Shoe Works in Otmęt (ex Batha Works) should be numbered among them.

Małapanew ironworks in Ozimek and ironworks in Zawadzkie ("Gen. K. Świerczewski" ironworks – present „Andrzej” ironworks) have been developing very intensively. Ruined chemical works in Kędzierzyn and Blachownia have been rebuilt in the 70's. of XX century [2].

The biggest works in Strzelce Opolskie is "Fabryka Sprzętu Rolniczego" „AGROMET" (earlier "Pionier"), which has been closed only in second half of the 90's.

In Brzeg after rebuilding of saved parts of sugar factory, Nadodrzańskie Zakłady Przemysłu Tłuszczowego (present "KAMA – FOODS" with foreign capital in the 90's) has arose and its period of the best prosperity has been the beginning of the 90's. Among the most effective works of that city we should put Fabryka Silników Elektrycznych „BESEL", which has started production in 1950, Fabryka Cukrów „Odra", "Fabryka Siewników" (later "Fabryka Sprzętu Rolniczego") and rebuilt and modernised Tannery (stopped to exist in 90's).

In Głubczyce area, the biggest works existing in pre – war period and continuing production after war are carpet and plush factory in Kietrz, Głubczyce brewery and sugar factory in Baborów.

In Opole, from pre-war period cement plants „Miasto Opole” – „Piaś”, „Groszowice”, „Nowa Wieś” – „Bolko” oraz „Opole Port” – „Odra” have survived. From mentioned cement plants “Bolko” and “Piaś” stopped their production before 1980. Years of economical crisis and transformation, only “Odra” cement plant (with foreign capital in 90’s) and cement plant built since 1973 in Strzelce Opolskie have survived. The one recently mentioned has connected with cement plant in Góraźdze and thanks to this connection it survived crisis of 90’s (with foreign capital in 90’s).

In Nysa, on the base of 3 former German companies, an existing till today “Zakład Urządzeń Przemysłowych” has been built [87]. “Fabryka Samochodów Dostawczych” has been built in 50’s. However, Polish economical transformation period and change in ownership form caused serious problems in keeping that works (bought by Korean company Daewoo – „Nysa Motor” went bankrupt).

The consequences after the socialist period in Poland were described as follows [...]”heritage unfavorable for any changes and development such as improper attitude towards work (work ethos pathology), social and technological discipline disorganizations (low product quality), pathological attitude towards any property [...]”lack of activity and lack of innovation pressure within the society”<sup>1</sup>. Social and economic system’s stability, including political system, were supported by propagandist actions such as “increasing the norms”, “production level competitions”, “socialist work competition” and creating socialist idols like “team leaders”[68].

Implementing market economy as a process required not only technological changes in industry but also in society’s awareness. According to W. Jacher „Restructuration is a cultural process, based in social awareness sphere, in social bonds, preferred value system, in regional identity and local government’s powers”<sup>2</sup>.

Citizens living in Opole province area having small farms were also looking for employment in industries creating new working class<sup>3</sup>. During transformation period many industrial plants stopped the production which resulted in losing jobs by many members of the working class. This situation had impact on immigrant population while natives “with descent” had an opportunity to work in the west (mainly Germany and Holland).

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<sup>1</sup> W. Jacher, Społeczna przestrzeń restrukturyzacji w przedsiębiorstwach polskich (na przykładzie Górnego Śląska), [w:] Przekształcenia społeczne w gospodarce, pod red. K. Koneckiego i J., Kulpińskiej, Wyd. Uniwersytetu Łódzkiego, Łódź 1994, p.16.[68]

<sup>2</sup> W. Jacher, Społeczna przestrzeń restrukturyzacji w przedsiębiorstwach polskich (na przykładzie Górnego Śląska), [w:] Przekształcenia społeczne w gospodarce, pod red. K. Koneckiego i J., Kulpińskiej, Wyd. Uniwersytetu Łódzkiego, Łódź 1994, p.15.[68]

<sup>3</sup> “Individual farms kept the biggest share in general agricultural area; around 76,7% in year 1962 comparing to social property which come to around 20%”. R.Weiner, Rolnictwo, [w:] Monografia gospodarcza województwa opolskiego, pod red. J. Popkiewicza, Opole 1996, p.62. [46]



Permanent or seasonal emigration included 26 thousands of people (in 1989 – 1997) and undoubtedly decreased unemployment in local work market in transformation period. On the other hand it has unfavourable influence on population reproduction, depopulation, oldering of countries and family parting [70].

Year 1989 meant the end of economy controlled by centre and moving on to market economy. On 1st January 1990 a new economic reform had been implemented by government. Opole province' national companies have been included by privatisation process from 1 VIII 1990 till do 31 XII 1994:

- Transformed into one – person companies of the Treasury – 33;
- Privatized by liquidation on the ground of decree – 162 [89].

National companies privatised by liquidation in Opole province in period from 1 VIII 1990 till 31 XII 1994 are:

- Put into liquidation state – 63,
- Being in liquidation state – 14,
- Declined or put into declined state – 12,
- Liquidated – 37 [89].

Privatisation and foreign investors' part in it became on of the most important elements of transformation process. We should mention, that in the respect of the number of companies with foreign capital, Opole Silesia takes 9 – th place in polish country [89].

Unfortunately many companies did not manage to survive through implementing market economy system in Poland; that is the reason for unemployment, homeless people, poverty and social pathologies.

## **1.2. Analysis of work conditions in work safety context**

Work conditions are complex term and have different definitions [60]. Very often to describe the whole phenomena constituting this term – its main elements are named. Thus, work conditions are material environment factors (including factors temporarily influencing the worker) and social conditions [67]. However the most common description of work conditions term say – that these are technical and organizational work conditions together with economic and social work conditions [66]. Following J. Olszewski – work conditions are superior to mentioned above. Technical and organizational work conditions and production process that uses them – influence the work environment. Material work conditions and work conditions organization define which kind of risk factors will workers be affected by. Material work conditions are elements such as working space and its filling with machines and devices required for specific production profile, work stands “equipment and its adjustment to workers” needs [66]. Machines and devices, their structure and performance influence work environment quality as well as workers' safety and health. According to J. Rosner, an ergonomics who defined proper work conditions says that they

should assure the worker with safety and comfort by its reliability [10]. That is the reason why machines and devices should meet the following requirements:

- assure safe, hygienic and possibly comfortable work conditions,
- protect the worker from injuries and electrocution,
- protect the worker from poisonous substances and other harmful physical factors,
- they should limit the strenuousness connected with work performance,
- they should assure the worker with comfortable working position according to work profile [40].

Material work conditions are determined by combined influence of material, physical, chemical and biological factors. According to professional literature and GUS statistics, the classification of threats concerning work conditions include: chemical factors (such as cancerogenic factors, industrial dust, industrial dust with asbestos and others, physical (noise, vibration, hot microclimate, cold microclimate, insufficient lighting, electromagnetic fields) and threats connected with work strenuousness like physical overload and biological factors.

Manner of performing work and harmful factors (physical, chemical and biological) both define what kinds of threats are present in specific work conditions [20]. Thus work environment characteristics and threats at specific work positions are determined by kind of production, technology used in given industry branch and work organization system. Work environment affected by harmful factors; even within the hygienic norms, influences workers organism in negative way. This together with working in effected body posture and an excessive physical effort might result in many physiological changes in workers' organisms [20].

The following M. Gajek's opinion can be the conclusion „The consequence of unfavorable work environment conditions are different losses such as employees' health deterioration, increased morbidity and employees' overwork which can lead to accidents during work”<sup>4</sup>.

### **1.3. Statistical analysis of work conditions in economy and industry of Opole province during the transformation period**

Until democratic election in 1989 and changes in political system enabled implementing transformations in national economy. First democratic government implemented economic program – “shock variant” to stabilize economy and forward it to market economy [44]. This program, succeed in bringing revolutionary changes in economy and every single area of social life. Together with it, many

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<sup>4</sup> M. Gajek, Health loss as the effect of participating in work process, Conference Proceedings, 18–20 September 2002, Scientific Bulletin MSTU “STANKIN” ITE’2002, Moscow, Rosja, t. p.612. [20]

actions changing the basis of economic system have been activated. This required a reform of economic law system and implementing ownership transformation of the public sector that still take place. Its consequence, were many new economic areas created in different branches of economy including industry. Moreover, a job market started to create, labour supply began to exceed labour demand and new economic units started to expect fast profits. Those factors influenced situation within the companies in work safety and conditions area.

This chapter uses information from statistical yearbooks<sup>5</sup>. Statistical yearbooks of Opole province as well as work condition reports have been used to conduct work conditions analysis. Just in yearbook from 1996 first information concerning work conditions came out as a separate chapter; what needs to be mentioned – they did not come out every year. Reports data Z-10 have been obtained in Opole province directly from selected companies, hiring defined number of workers<sup>6</sup>. They were included in national statistics in 1983 and called „yearly reports concerning work conditions” and from 1991 were known as „Z-10 reports concerning threats present at work stands and welfare connected with it”[123]. Important fact from data elaboration point of view is that the number of workers exposed to threatening and strenuous conditions presented in those reports concerns only the cases where permissible norms NDS or NDN were exceeded<sup>7</sup>.

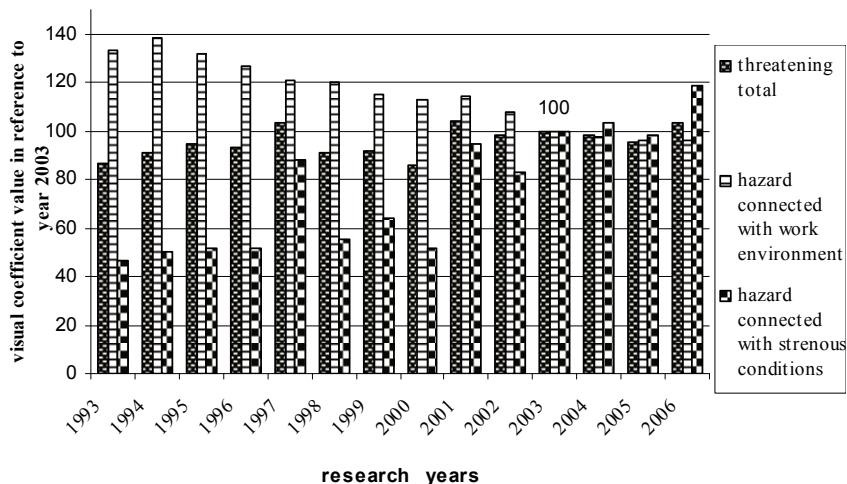
Picture 1.1. presents the dynamics of changes in threatening work conditions in Opole province economy during transformation period; the point of reference is year 2003 which is the year proceeding Poland accessing European Union.

While analyzing data presented on picture 1.1. we can notice crucial changes in threatening conditions „in general” in comparison to year 2003. Starting with year 1994 threatening work conditions “in general” were increasing but in years 1997, 2001 and 2006 they slightly exceeded level from the year 2003. Threatening work conditions in examined period are characterized by two explicit trends. First trend shows an significant exceeding of visual coefficient up to 140 in year 1994 and then its decrease. In the period proceeding Poland accessing European Union, threatening work conditions dominated over work performance „strenuousness”. Starting with year 2002 this proportion reversed. „Strenuousness” from visual coefficient 46,6 in year 1993 reached 120 in year 2006. It means that in examined period, conditions in which work was performed were systematically deteriorating in province’s economy while harmful work conditions level was decreasing.

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<sup>5</sup> Those information have crucial meaning because they are being continually conducted by governmental statistical unit (GUS), that enable to analyze various areas of social life and accompanying phenomena. While analyzing certain yearbooks we can notice specific preferences resulting from current political trends [62].

<sup>7</sup> NDS – Highest permissible Concentration of harmful factor; NDN Highest Permissible Intensity of harmful factor.



**Pic. 1.1.** Visual coefficient value in reference to year 2003 in changes of threatening work conditions in economy. Self elaboration on the grounds of Opole province' statistic yearbooks

### 1.3.1. Work safety and scale of harmful conditions threat in the industry

Economy restructuration after year 1990 had crucial consequences – economic and social. Its result were changes especially in industry which influenced work conditions and work safety.

In period of economical changes, many industry works introduced many changes, like delimiting number of employed, introducing better marketing policy and searching for foreign investors. The example of drastic cuts in number of employees are data presented in table 1.1.

The most significant decrease of number of employed workers can be noticed in ironworks in Ozimek and Zawadzkie, and Chemical Works in Blachownia. Part of these companies no longer exist on Opole province' job market. In many of them, the employment level decreased for about 50 – 67% in comparison to year 1985. System transformation which cause such a drastic changes in number of the employed also influenced work conditions in whole province's economy and industry.

In this first period of economic changes many polish economy had to cope with many obstacles, difficult work conditions, problems connected with financial problems making them to delimit outcome for health and safety regulations. After “shocking” period in economy and first experiences connected with market economy, a phase of establishing those changes in companies and further adjusting to changing work protection environment took place. Table 1.2. below presents changes that took place in threatening work conditions in Opole province industry in years 1995 – 2006.

**Table 1.1.**

Change in employment level in selected industrial plants  
in Opole province in selected time

| Employment level in selected industrial |   | Selected years     |      |      |      |       |       |       |
|---|---|--------------------|------|------|------|-------|-------|-------|
|   |   | 1985               | 1989 | 1991 | 1994 | 1995  | 1997  | 1999  |
|   |   | number of employed |      |      |      |       |       |       |
| 1/                                      | Zakłady Azotowe Kędzierzyn – Koźle        | 6454               | 6479 | 5324 | 3977 | 4057  | 3780  | 2560  |
| 2/                                      | Zakłady Koksownicze Zdieszowice           | 4555               | 4400 | 4366 | 4290 | 4231  | 3819  | 2848  |
| 3/                                      | Elektrownia Blachownia                    | 739                | 698  | 686  | 635  | 783   | 698   | 484   |
| 4/                                      | Huta “Andrzej”Zawadzkie                   | 4501               | 4016 | 3473 | 3086 | 3000  | 2629  | 1339  |
| 5/                                      | Huta Ozimek                               | 6539               | 5384 | 4265 | 3256 | 3362  | 2869  | 1883  |
| 6/                                      | Motor Nysa                                | 1885               | 2359 | 1822 | 1513 | 1558  | 1548  | 1369  |
| 7/                                      | ZUP Nysa                                  | 2872               | 2650 | 2037 | 1596 | 1504  | 935   | 764   |
| 8/                                      | AGROMET Strzelce Opolskie                 | 2163               | 1865 | 1198 | 958  | ----- | ----- | ----- |
| 9/                                      | AGROMET Brzeg                             | 1160               | 1066 | 710  | 578  | 596   | 540   | 401   |
| 10/                                     | Zakłady Chemiczne Blachownia              | 3955               | 3526 | 2881 | 2526 | 2549  | 1521  | 57    |
| 11                                      | Cementownia Strzelce Opolskie             | 1631               | 1381 | 1238 | 989  | 949   | 801   | 610   |
| 12/                                     | Cementownia Góraźdże                      | 2444               | 2115 | 1976 | 1596 | 1527  | 1345  | 1074  |
| 13/                                     | Cementownia Groszowice                    | 613                | 506  | 482  | 346  | ----- | ----- | ----- |
| 14/                                     | Zakłady Papiernicze Krapkowice            | 1905               | 1726 | 777  | 1140 | 1186  | 1004  | 450   |
| 15/                                     | Otmęt                                     | 5168               | 3946 | 2760 | 1625 | ----- | ----- | ----- |
| 16/                                     | Frotex Prudnik                            | 2618               | 2540 | 1865 | 1648 | 1708  | 1622  | 1315  |
| 17/                                     | NZPT Brzeg                                | 785                | 760  | 764  | 737  | 778   | 757   | 581   |
| 18/                                     | Cukrownia Baborów                         | 264                | 237  | 355  | 221  | 303   | 240   | 232   |
| 19/                                     | Zakłady Przemysłu Ziemniaczanego Namysłów | 194                | 212  | 158  | 92   | 96    | 165   | 90    |

Indications: ----- Industrial plant is no longer functioning

Source: Self elaborations on the grounds of Z-10 reports from mentioned industrial plants [50]

**Table 1.2.**

Workers employed in threatening work conditions in Opole province industry  
per 1000<sup>8</sup> in selected time

| Years                          | Grand total persons<br>working in hazardous<br>conditions |                                     | Hazard connected with: |                                     |                      |                                     |
|--------------------------------|---|-------------------------------------|------------------------|-------------------------------------|----------------------|-------------------------------------|
|                                |   |                                     | Work environment       |                                     | Strenuous conditions |                                     |
|                                | Total   | of which<br>one group<br>of factors | Total                  | of which<br>one group<br>of factors | Total                | of which<br>one group<br>of factors |
|                                |   | [%]                                 |                        | [%]                                 |                      | [%]                                 |
| industry „total”               |   |                                     |                        |                                     |                      |                                     |
| 1995                           | 170   | 80,0                                | 136                    | 76,5                                | 22                   | 95,5                                |
| 1997                           | 190   | 82,6                                | 129                    | 76,7                                | 48                   | 97,9                                |
| 1999                           | 168   | 83,9                                | 123                    | 82,1                                | 27                   | 85,2                                |
| 2000                           | 164   | 84,1                                | 125                    | 80,8                                | 24                   | 91,7                                |
| 2001                           | 187   | 81,8                                | 121                    | 77,7                                | 50                   | 88,0                                |
| 2002                           | 176   | 85,8                                | 115                    | 80,9                                | 46                   | 97,8                                |
| 2003                           | 181   | 84,5                                | 103                    | 80,6                                | 58                   | 98,3                                |
| 2004                           | 187   | 87,2                                | 105                    | 80,9                                | 65                   | 100                                 |
| 2005                           | 185   | 88,1                                | 103                    | 79,6                                | 66                   | 100                                 |
| 2006                           | 186   | 88,2                                | 95                     | 82,1                                | 75                   | 98,7                                |
| of which processing industry * |   |                                     |                        |                                     |                      |                                     |
| 2003                           | 189   | 83,6                                | 110                    | 80,0                                | 57                   | 98,2                                |
| 2004                           | 193   | 86,5                                | 113                    | 80,5                                | 63                   | 98,4                                |
| 2005                           | 190   | 87,4                                | 110                    | 79,1                                | 65                   | 98,5                                |
| 2006                           | 193   | 88,1                                | 103                    | 81,6                                | 74                   | 98,6                                |

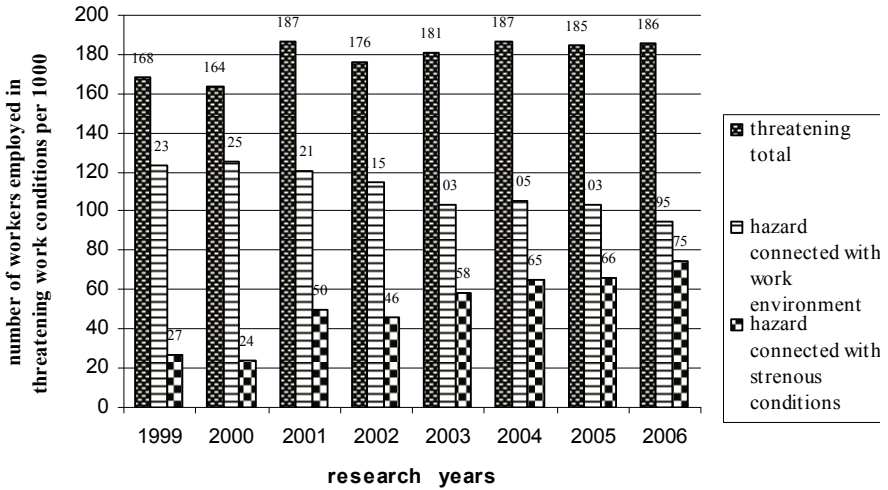
\*Information concerning processing industry came out for the first time in Opole province statistical yearbooks in 2003.

Source: Self elaboration on the grounds of Opole province statistical yearbooks

Analysis of presented information shows that threatening work conditions in industry “in general” slightly increased just like in processing industry. In examined period a threat caused by “one group of harmful conditions” concerned a significant percentage of workers employed in threatening work conditions “in general”. In case of “work strenuousness” threat, a percentage of workers threatened by one harmful factor is very high. Those data should be interpreted as positive it means that industry workers and processing industry workers are threatened by only one factor exceeding NDS or NDN norms.

<sup>8</sup> Number of workers employed in threatening work conditions according to Opole province statistical yearbooks. They are listed only once by predominant factor, i.e. the factor having the most hazardous effect at a given work post.

Picture 1.2. presents information about the number of workers employed in threatening “in general” work conditions in Opole province industry per 1000.



**Pic. 1.2.** Number of workers employed in threatening work conditions in Opole province industry per 1000. Self elaboration on the grounds of Opole province’ statistical yearbooks

Analysis of those data shows that the situation of workers employed in threatening work conditions in industry “in general” got worse in examined period. First place was taken by work conditions strenuousness that doubled in examined period. Thus, the situation in industry is similar to situation of economy in Opole province, where threats caused by work conditions strenuousness increased in comparison to work environment threats.

Another point of interest of the research was Z-10 report concerning to work conditions where the “person threaten” phenomenon has been analyzed. Moreover, a term of harmful conditions relative value  $W_{ZCX}$  have been implemented in reference to number of workers employed in selected industrial unit.

$$W_{ZCX} = \frac{\sum OZ_X}{L_{ZATR}} \cdot 100 [\%]$$

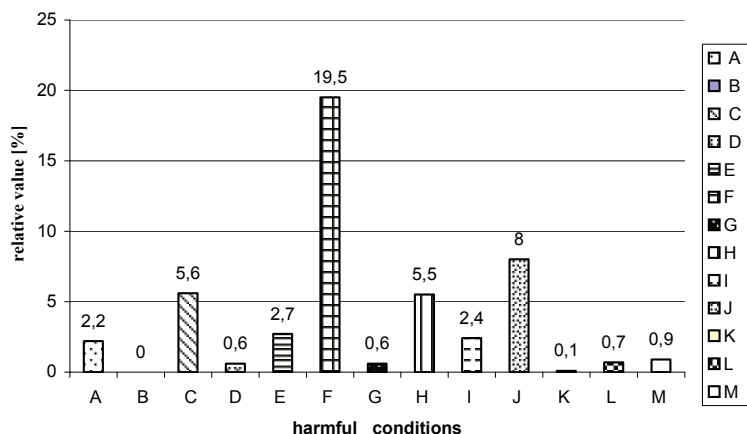
where:  $W_{ZCX}$  – harmful conditions relative value;

$OZ_X$  – number of workers threatened by specific harmful condition estimated on 31 of December of given year (“person threaten”);

$L_{ZATR}$  – number of workers in selected industrial unit on 31 of December of the same year.

On the grounds of professional literature and self elaboration we can say that the most harmful threat in industry “in general” and for most of industry branches in the beginning of transformation period is “noise”. In other cases

“other dust” factor in wood and paper industry and “insufficient lightening” factor in metal industry also reached high level. Picture 1.3. presents threats quantities present in Silesia region’s industry in 18 branches in given year [14].



**Fig. 1.3.** Harmful conditions relative value in year 1994. Indicators: A – chemical substances; B – cancerogenic substances; C – dust fibrosis; D – dust with asbestos; E – other dust; F – noise; G – vibration; H – hot microclimate; I – cold microclimate; J – insufficient lighting; K – ionization radiation; L – electrostatic field; M – other

Data have been elaborated according to KGN (National Economic Activity Classification) for year 1994<sup>9</sup>.

The analysis shows that the most numerous percentage of workers hired in over norm conditions is exposed to “noise” (19,5%) and “insufficient lighting” (8%). Third place is taken by industrial “dust fibrosis” (5,6%) and “hot microclimate” (2,4%) on fourth place. Following threats are “other industrial dust” (2,7%), “cold microclimate” (2,4%) and “chemical substances” (2,1%). Group “other” harmful work conditions has taken eight place in this classification and includes infrared radiation, laser radiation, ultraviolet radiation, infra and ultra sounds, barometric pressure and biological factors. In examined 18 industry branches a threat topography have been established, however it can not be treated as a constant and representative for the whole industry. Differences can be found not only between particular industry branches but also between work stands of the same company depending on production profile and company’s economic situation.

Established topography of human health threatening conditions that indicates “noise” as a dominant factor since occupational deafness dominates in

<sup>9</sup>KGN (National Economic Activity Classification) was a hierarchic systemized division of organizational units creating national economy which was used in planning and statistics. Industry division included branches and trades.



occupational diseases classification; which can be found and confirmed by professional literature and this elaboration.

#### **1.3.1.1. Work conditions in selected industry branches**

Second place in reference to average exposure to threatening work conditions is taken by wood and paper industry, thus this particular industry branch will be analyzed and presented as an example. Research referring to work safety have been conducted in two wood processing industry works, first one produces furniture while second one deals with wood processing for building industry (2008) [61].

Wood processing industry exposes workers to many various harmful conditions and risk of accidents. Many negative health consequences can be caused by wood dusts because they irritate and can cause allergic reactions; some of them have even cancerogenic properties [84]. Exposition to these factors can cause:

- Sensitiveness and irritation of air passages. It can contribute to asthma and chronic inflammation of mucous membrane. Asthma's symptoms caused by wood dusts can be cough, sultriness and whistling breath. Dust of processed trees growing in warm climate can also cause allergic reactions.
- Skin sensitiveness in form of allergic contact skin reaction. Eczema, skin rash can be caused by dust from processed pine trees – this can lead to epidermic callosity.
- Toxic reactions. Dusts of some of processed trees can be toxic which can cause skin rube faction. It is caused specifically by trees producing ethereal oils, such as juniper, camphor wood.
- Cancerogenic consequences in respiratory system. Dusts from oak, beech, mahogany tree, nut tree, acacia, chestnut, rosewood and other hard trees can cause cancer of mucous membrane and antrum sinuses [84]

In wood processing industry workers are also exposed to vibrations which is threatening factor because general and endemic tremors influence on human health. Results of exposure to general vibrations are:

- Inner organs disorders, internal bleedings, hematoma and even mechanical ruptures of organs;
- Balance disorders; labyrinth disorders, spine illnesses, muscle and tendon disorders and damage;
- Vision deterioration;
- Digestive, reproductive and blood vascular system disorders [35].

Results of exposure to endemic vibrations are:

- Pathologic changes in arms' blood vascular system
- Pathologic changes in osseous and joint system of arms and palms
- Disorders in arm muscle and tendon system
- Pathologic changes in nervous system – feeling sense deterioration, temperature and touch deterioration, cramps, numbness and fornication of hands and fingers [35].

Mechanical vibrations have wide spectrum of influence on human organism. However, just like in case of any other harmful factors, its exposure cumulates within the years – the risk increases depending on time of exposure to those factors and their intensity.

In final part of wood processing, many chemical substances are used to prepare the final product [83]. Chemical factors present in carpentry workshops are substances included in ingredients of wood glues, steins, varnishes and thinners.

Generally, all of these substances are highly flammable and combined with oxygen can create explosive substances. Xylen isomer pairs and octane ethyl pairs are heavier than oxygen and they assemble in bottom parts of the rooms, which can cause not only health threats but can also be a cause of explosions.

**Table 1.3.**

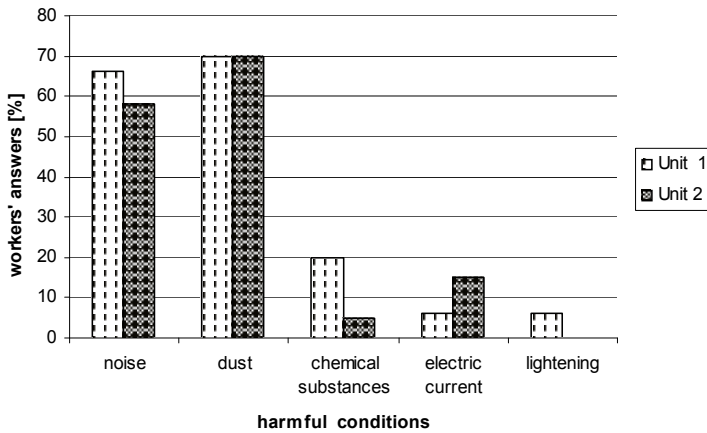
Workers of examined companies according to age, sex, education, profession by education, performed occupation and job seniority

| Worker's characteristics | Total | Production unit 1<br>(Furniture production) | Production unit 2<br>(Building industry) |
|--------------------------|-------|---|--|
|                          |       | [%]   |  |
| Age:                     |       |   |  |
| 18 – 24 years            | 28,9  | 30,0  | 27,5                                     |
| 25 – 35 years            | 32,2  | 30,0  | 35,0                                     |
| 36 – 45 years            | 27,8  | 32,0  | 22,5                                     |
| over 46 years            | 11,1  | 8,0   | 15,0                                     |
| Sex:                     |       |   |  |
| man                      | 98,0  | 96,0  | 100,0                                    |
| Education:               |       |   |  |
| elementary               | 4,0   | 4,0   | 5,0                                      |
| vocational               | 77,0  | 82,0  | 70,0                                     |
| secondary                | 11,0  | 10,0  | 13,0                                     |
| technical secondary      | 8,0   | 4,0   | 13,0                                     |
| higher                   | 0     | 0   | 0  |
| Profession (education):  |       |   |  |
| woodworker               | 73,3  | 72,0  | 75,0                                     |
| other                    | 26,7  | 28,0  | 25,0                                     |
| Performed profession:    |       |   |  |
| woodworker               | 87,8  | 78,0  | 100,0                                    |
| other                    | 12,2  | 22,0  | 0  |
| Work seniority:          |       |   |  |
| Less than 1 year         | 18,0  | 18,0  | 18,0                                     |
| 1 – 5 years              | 31,0  | 40,0  | 20,0                                     |
| 6 – 10 years             | 28,0  | 26,0  | 30,0                                     |
| Over 11 years            | 23,0  | 16,0  | 32,0                                     |

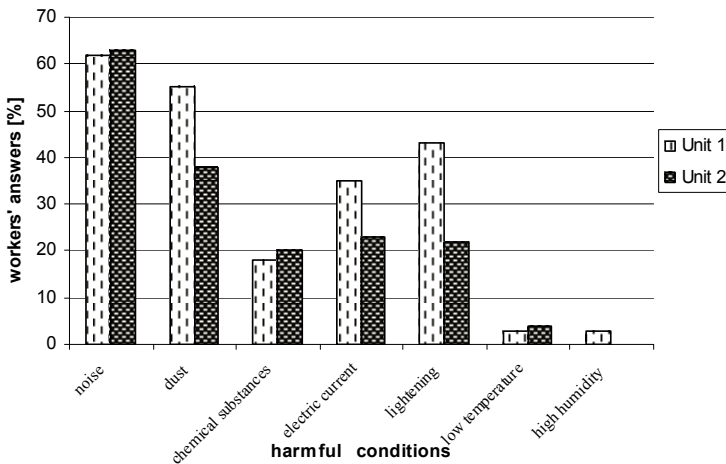
Source: Self elaboration [61].

Table 1.3. presents information concerning workers of selected companies, mostly men [61]. First step of this research was to identify factors and to find out if in workers' opinion they have an influence on their work condition. In the beginning of the research workers described work environment factors present at their work stands, it is presented on pictures 1.4 and 1.5.

Picture 1.4 presents workers' opinion concerning harmful and dangerous factors present in examined wood industry unit. Over 60% of respondents of furniture company mentioned noise and such factors as dusts (70%), chemical factors, electric current and lightening.



**Pic. 1.4.** Workers' answers concerning work environment factors present at their work stands; both on harmful and dangerous level (Production unit 1 – Furniture production; Production unit 2 – Building industry)

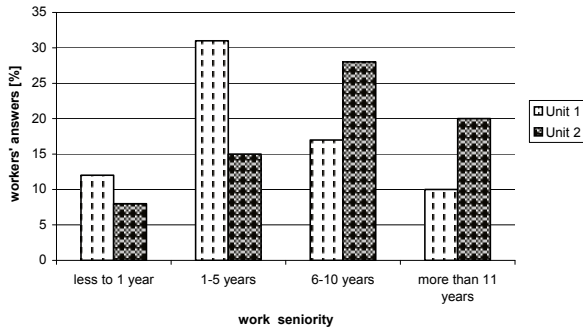


**Pic. 1.5.** Workers' answers concerning work environment factors that obstruct performing work (Production unit 1 – Furniture production; Production unit 2 – Building industry)

Picture 1.5. presents evaluation of harmful factors influencing both health and performing work tasks.

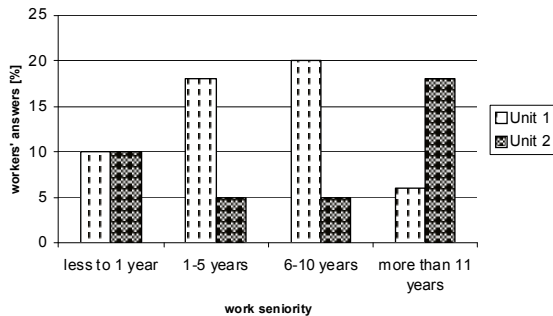
Number of factors that cause obstacles was higher by two indications than on picture 1.4. [61]. Similar order of harmful factors was created by workers from furniture company.

Only few of both industry sites' workers mentioned factors connected with work environment microclimate. Undoubtedly, the greatest threat for workers' health in both industry sites is noise and dust; workers are fully aware of this fact. Pictures 1.6. and 1.7. present how workers with different work seniority estimate dusts as a harmful or dangerous factor and if they consider it as factor that is strenuous or obstacle for their work performance [61].



**Pic. 1.6.** Workers' answers concerning dust as a harmful or dangerous factor; taking into account their work seniority (Production unit 1 – Furniture production; Production unit 2 – Building industry)

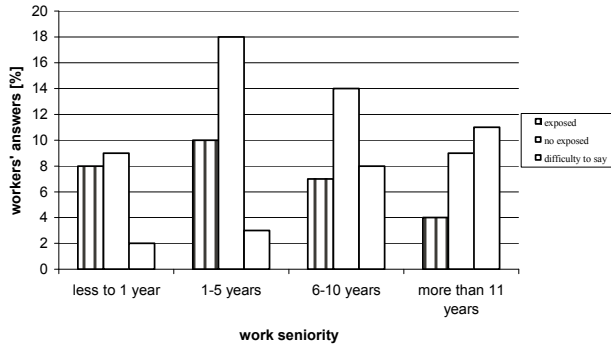
Data presented on picture 1.6. show that most of workers consider dust as a harmful or dangerous factor, however that is opinion of workers with long work experience and seniority. Short work seniority workers do not perceive this threat. The reason might be the fact that they are gradually introduced to character of their work stands and do not work at dusted work stands.



**Pic. 1.7.** Workers' answers concerning dust as a strenuous factor while performing work; taking into account their work seniority (Production unit 1 – Furniture production; Production unit 2 – Building industry)

Workers; especially furniture company think that dust is one of the most strenuous factors and that it obstacles their work performance (pic.1.7.).

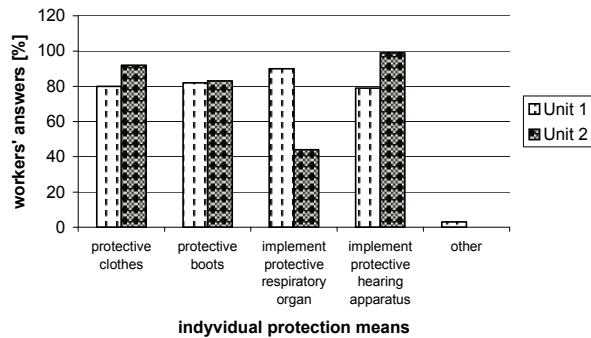
Picture 1.8. presents workers opinions concerning their exposure to chemical factors [61].



**Fig. 1.8.** Workers' answers concerning their exposure to chemical factors; taking into account their work seniority (Production unit 1 – Furniture production; Production unit 2 – Building industry)

Majority of workers think that they are not exposed to chemical substances. Among workers exposed to chemical substances; in their opinion, they are the most exposed to inhaling them and the least for direct contact with their skin. Thus, work safety in this kind of companies requires using means to protect respiratory system against harmful factors such as mask, half masks or other body covers. In case of dust it is crucial to keep work stands clean according to hygienic rules. Almost all of the respondents declare they do it.

Human health protection against harmful factors means not only using individual protection means; they should be only an addition to other safety means. Further results concern how this knowledge is being applied in practice. A picture below (pic.1.9.) presents the percentage listing of workers' answers concerning using specific groups of individual protection means [61].



**Fig. 1.9.** Workers' answers concerning using individual protection means at their work stands (Production unit 1 – Furniture production; Production unit 2 – Building industry)

Protection against exposure to dust, especially at work stands with high dust factor level is crucial; thus wearing protective clothing against dust and chemical factors is very important. Most of respondents declare using it. However there are differences in declarations concerning using respiratory system protections equipment. We can conclude that workers of second company are provided with different protection means against dusting.

Availability of individual protection means and their amount do not influence their usage. On the grounds of workers' declarations we can state that they are aware of work environment threats and use individual protection means; in both industrial works protective boots and clothes are obligatory.

Noise is an inseparable element of production process in this type of industrial units. Noise emission is connected with lathes, processing machines and processing parameters. Noise intensity during wood lathe processing such as circular saws, milling machines and other processing machines very often exceeds acceptable level 85dB [3;33]. That is the reason why any means should be taken to delimit noise emission. Minimizing noise threat can be conducted by [...]”suppressing vibrations and using noise protecting covers and shields on the machine”<sup>10</sup>. According to workers; their employers try to prevent and excessive noise using different technical and organizational methods.

Table 1.4. Presents methods and solutions used in wood industry companies to delimit excessive noise level.

**Table 1.4.**

Methods preventing from excessive noise

| Methods preventing from excessive noise  | Production unit 1 | Production unit 2 |
|--|-------------------|-------------------|
|  | [%]               |                   |
| Systematic greasing and screwing machines' elements                            | 80                | 83                |
| Placing machines on special amortizing surfaces                                | 36                | 20                |
| Placing machines on separate footings not connected with building construction | 22                | 15                |
| Using noise absorbing surfaces   | 50                | 38                |
| Using noise absorbing and isolating shields to protect specific work stands    | 18                | 0                 |

Source: Self elaboration [61].

Those industrial sites use dust stays to delimit wood dust emission to environment.

<sup>10</sup> A. Dąbrowski i in. Charakterystyka zagrożeń stwarzanych przez maszyny produkcyjne, Wydanie drugie poprawione, Centralny Instytut Ochrony Pracy, Warszawa 1998, p.67. [3]

Putting together results mentioned above (percentage of ventilation systems, keeping work stands clean and obeying to hygiene rules) we can state that examined industrial sites put an effort to delimit dust emission and moreover to protect workers respiratory systems. The 88% of all examined workers use protective respiratory masks.

Another element that needs to be mentioned in wood industry work safety area is number of methods preventing from hazardous mechanical factors. They have a great influence on workers safety.

Of course, the arrangement of work stands is not a warranty of work safety. Source of threats and potential accidents is mainly in the back of processing area. Wood processing machines are commonly used productions machines such as circular and band saws, milling machines and others. In most of those machines or tools the processed material is being manually pushed into the machine. Potential accidents are connected with operating of those machines. Such threats in professional literature are divided into three groups:

- threats connected with steering system,
- mechanical threats,
- non mechanical threats [3].

Non mechanical threats, beside harmful conditions, are:

- fire or wood dust compound with oxygen explosion; the cause of explosion can be material that electric installation is built of and electrostatic charge of the material. Also sparkling of electric installation as well improper processing parameters causing overheating of machine and processed material can result in explosions or fires,
- threats connected with hydraulic or pneumatic installations, they can be a source of sudden release of medium under high pressure,
- thermal threats – sources of those threats can be engines, some tools and releasing heat during processing which depends on processing pace. If the processing pace is too high then the material can get on fire [3].

Accident sources are also processing tables' sharp edges, protruding machines elements and so on, they usually cause minor injuries. Serious injuries are more often caused by moving elements of the machines, parts of the machines or tools that accidentally broke off or tossing off processed material such as spinners, knurs, and chips [3].

On the basis of obtained data we can state that 53% of examined workers use clothes protecting them from mechanical factors. They are aware that at  $\frac{3}{4}$  of work stands they might be in danger because of moveable machine elements and processed products. 70% of workers have contact with sharp edges and objects and rough surfaces.

Moreover, 66% of examined workers state they are protected from tossing of processed materials; 26% claims those protection is partial only.

Moreover, respondents think that fire protection means present at their work stands are sufficient as well as the have a positive opinion about first aid access in case of emergencies. Generally workers had some doubts about their

own ability to provide first aid. Final question referred to subjective feeling of safety at work stands. Obtained answers show that most of workers consider their work stand as safe (78%) and only 22% could not give unequivocal answer to this question.

The fact that over  $\frac{3}{4}$  of workers feel safe during performing their duties is a result of their employers who actively provide them with protective means.

On the grounds of research, presented here partially, we can state that workers are satisfied with protection provided by their employers.

Harmful factors identification has a crucial meaning for improving workers' awareness referring to potential health and life threats. It is the first step to active participation in work safety management.

## **Recapitulation**

Opole province' industry characteristics shows how diverse and wealthy it is. The industry was using rich natural resources and numerous human resources. Very often farms were being employed in this economy branch. Well organized professional education system in former socialist system was providing well educated human resources. Ownership transformation and restructuring led to closing down and limiting of this potential of Opole province' economy. Companies restructuring and national property privatization was taking place within the whole Poland as well as within the Opole province. Mineral industry which was characteristic for Opole province lost its significant position in examined period, only few cement plants survived. The number of large industrial plants in Opole province during economic transformation decreased; those that survived had to delimit number of employees.

Evaluating the first phase of transformation (till year 1994) we can notice that the most difficult work conditions connected with the highest threatening conditions factors level can be found in electro – engineering and wood industry.

In next phase – at XX/XXI century – threatening work conditions level in economy of Opole province was continuously increasing; it stabilized in recent years. Threats “in general” oscillated from 168/1000 employees in year 1999 till 186/1000 employees in year 2006. Characteristic feature of this period is change in relation connected with work environment in comparison to work strenuousness threats. Between 1999 – 2006 work strenuousness increased triple, from 27/1000 to 75/1000 employees.

Detailed work conditions analysis in selected works of wood industry shows how differentiated harmful factors are. Wood industry workers very often work in small rooms, production area is dusted, wood processing machines cause extensive noise level that not only makes employees' work difficult but also causes hearing apparatus and health damage. Noise is an obstacle to proper communication between workers, this can cause accidents. Wood processing



industry workers are also exposed to harmful chemical substances used in this type of production. Wood dust and chemical substances pairs can cause dangerous flammable compounds that can cause explosions.

To recapitulate we can say that:

1. work conditions improvement influences on social work conditions; on the other hand they influence work efficiency bringing positive results for national and Opole province' economy;
2. work environment quality influences on workers' well – being, health and can also influence product quality [16].

Workers' poor health condition causes not only decreased work efficiency but also occupational diseases requiring further rehabilitation and pensions that become burden for the whole society. Production process should be regularly verified and improved, not only to achieve high quality products but also to increase work safety level and work environment quality.



## Chapter 2

### OCUPATIONAL DISEASES AND ACCIDENTS AT WORK IN OPOLE PROVINCE'

Situation in polish industry that survived through transformation period, keeps on running and improves, should also be considered from the employees point of view. Work conditions not only influence on work quality but also on society's health. However, very often a situation on employment market make workers to take up jobs exposing them to occupational risk. Thus, work conditions, especially in industry influence the number of new cases of occupational diseases in Poland.

#### 2.1. Occupational diseases as a result of threats present in work environment

Pronouncing the medical opinion of occupational disease means that the disease is included in the list of occupational diseases and that there is a causal connection between the disease and work environment conditions. GUS statistics define "Occupational disease as a disease caused by harmful conditions present in work environment or by specific work character"<sup>11</sup>.

Numbers of occupational diseases certified every year prove the negative influence of negligence in work conditions area and threats caused by work environment factors or work performance. Number of occupational diseases in Opole province in the beginning of XXI century exceeded 100 cases a year. Initially province's statistics concerning compensations connected with cases of accidents at work and occupational diseases were counted together. They contain "work accident and occupational diseases compensations", "compensatory payments", "compensatory payments connected with occupational rehabilitation" including compensations costs. Table 2.1. present amounts of compensation within Opole province during three selected years.

In analyzed period a decrease in amounts of compensation connected with work accidents and occupational diseases can be noticed. Picture 2.1. presents numbers of occupational diseases cases "in general" in Opole province in years 2000 – 2006<sup>12</sup>.

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<sup>11</sup> Statistic yearbook of Opole province, Opole 2005, p.128. [116]

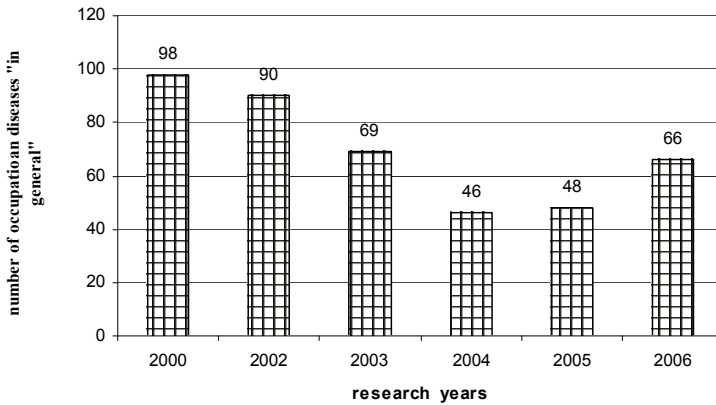
<sup>12</sup> Information concerning occupational diseases came out for the first time in Opole province statistical yearbooks in 2003.

**Table 2.1.**

Compensation amounts related to work accidents and occupational diseases  
in Opole province in selected years

| Kinds of compensation  | Number of compensation |      |      |
|--|------------------------|------|------|
|  | 2000                   | 2001 | 2002 |
| Compensation due to work accidents and occupational diseases | 662                    | 654  | 572  |
| Compensations for work accidents and occupational diseases   | 6                      | 11   | 3    |
| compensatory payments for rehabilitation services            | 20                     | 11   | 8    |
| total  | 688                    | 676  | 583  |

Source: Self elaboration on the grounds of Opole province' statistical yearbooks.



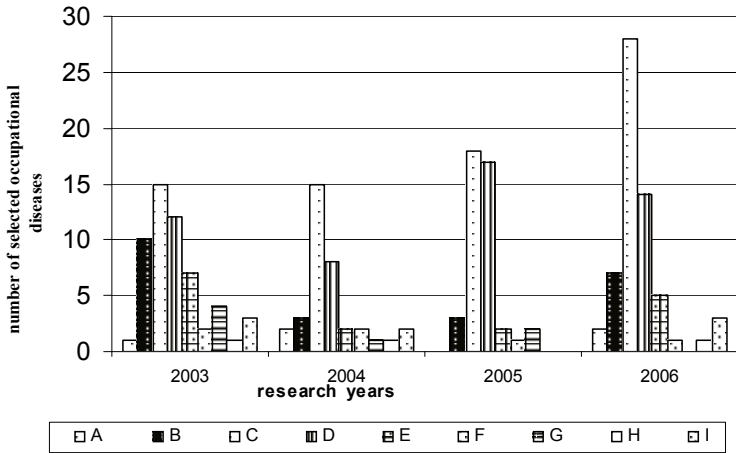
**Pic. 2.1.** Number of occupational diseases "in general" in Opole province in selected years.  
Self elaboration on the grounds of Opole province' statistical yearbooks  
(\*lack of data after year 2001).

We can observe oscillation of numbers of occupational diseases cases "in general" but it can not be linked in any way with threatening work conditions; the reason for this is that occupational diseases develop through many years of work. Number of occupational diseases cases during those years in Opole province did not exceed 100.

Picture 2.2. presents numbers of selected occupational diseases in Opole province in years 2000 – 2006. First place in year 2004 and 2006 is taken by chronic diseases of vocal organ; infectious and parasitic diseases or their sequels overtook hearing apparatus diseases in occupational diseases ranking. Mentioned groups of diseases have increasing tendency.

Number of new cases in analyzed period did not exceed 30 in selected groups of occupational diseases. On these grounds we can state that work conditions, especially in industry area definitely improved. It might be connected with

strict work conditions control linked with preparing polish economy to access European Union and implementing ISO norms [53].



**Pic. 2.2.** Numbers of selected occupational diseases in Opole province in years 2003 – 2006. Self elaboration on the grounds of Opole province’ statistical yearbooks. Indicators: A – pneumoconiosis, B – hearing apparatus damage, C – chronic diseases of vocal organ, D – infectious and parasitic diseases, E – skin diseases, F – acute and chronic intoxications, G – vibration syndrome, H – diseases of visual system induced by physical, chemical or biological agents, I – chronic diseases of locomotor system

## 2.2. Work accidents in economy and industry

We can assume a priori that occurring accident at work is a result of low safety level. „Conditions in which work process undergo, and especially work environment have a significant influence on increased number of diseases and injuries and on accelerated occupational and social deactivation of the workers”<sup>13</sup>.

This chapter presents statistic data analysis which will enable the evaluation of work safety levels in selected periods<sup>14</sup>. Polish labour law describes accident at work as sudden event caused by external factor connected with work process.

<sup>13</sup> M. Gajek, Health loss as the effect of participating In work process, Conference Proceedings, 18 –20 September 2002, Scientific Bulletin MSTU “STANKIN” ITE’2002, Moscow, Rosja, t. p.612. [20]

<sup>14</sup> „An accidents at work is sudden event resulting in the injury of a person, caused by an outside factor, which occurred during or in connection with an employee performing; normal tasks, orders of superiors, tasks in the interest of the company (included employee initiated) as well as while an employee is at the company’s disposal or while traveling between the company’s head office and the workplace as defined in the work agreement”. Opole province statistical yearbook, GUS Opole, Opole 2002, p.289. [113]

Accidents' causes are often difficult to define and very complex, thus its results are estimated as direct or indirect costs bore by both employer and employee. Indirect result of accident at work can be organism's damage defined in professional literature as health damage, disability or even victim's death. Each accident brings wide and complex consequences; not only economic and social but also those difficult to define – moral [21].

Accidents at work resulting in disability should also be considered from social point of view. Victims experience physical suffering and psychological problem which are very difficult to deal with; compensation is impossible. These consequences influence victim's family directly. Individual's status changes – the person becomes unable to work or person's ability to work becomes limited. Thus, social consequences are closely connected with economic ones; besides compensation paid by insurer, the victim is due to obtain pension for many following years as well as to get benefits so as to support victim's family. As a consequence, the victim requires government's active help, support from institutions working within social policy.

Changes in classifying economic units in examined area made accident rate analysis impossible until year 1990 [88]. Thus, further part of a chapter will use different time frames for statistic data comparison. Unfavorable work conditions regarding work performing strenuousness connected with an excessive physical effort, effected body posture, static work domination, all of them together with human and organizational factor increase the possibility of accidents at work.

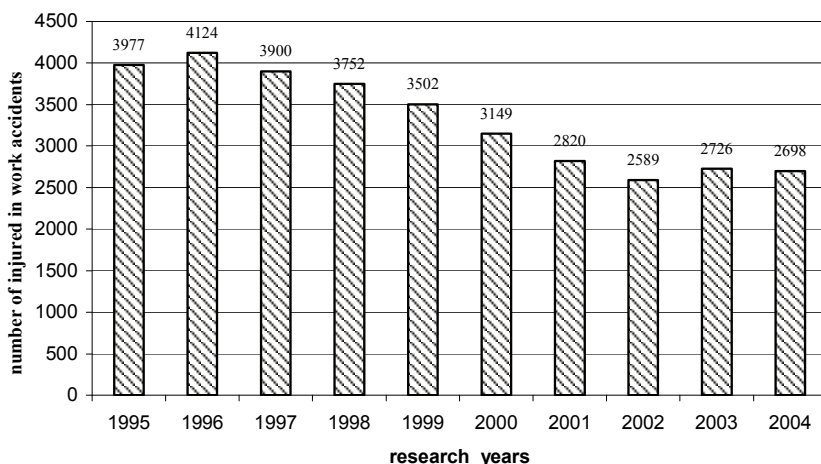
Expenses connected with accidents at work include direct and indirect losses, which can be presented as defined costs of accidents at work. In the literature, in complex estimation of that cost, we can notice a tendency to valuation their macro – economical effects. In practice, they signify value of not produced goods. These losses are the result of taking away from work of other workers or work – breaks happening during accident. Absence of the injured at work forces the employer to educate a new employee to work at particular work stand [23,67]. Moreover, as a result of occurred situation, a damage or destruction of tools, devices, machines, materials and costs connected with first aid and removing effects of accident may appear. Worker, as a result of the accident, bears losses like delimiting or complete loss of ability to work, which means delimiting of possibility to earn and deterioration of financial situation of his family [23].

Evaluation of accident rate in Opole province has been conducted on the grounds of data included in "Opole province statistical yearbooks"<sup>15</sup>. The starting point was an analysis of number of work accidents in general, which is presented on picture 2.3. [63].

Analyzed data concern workers, excluding private farms in agriculture.

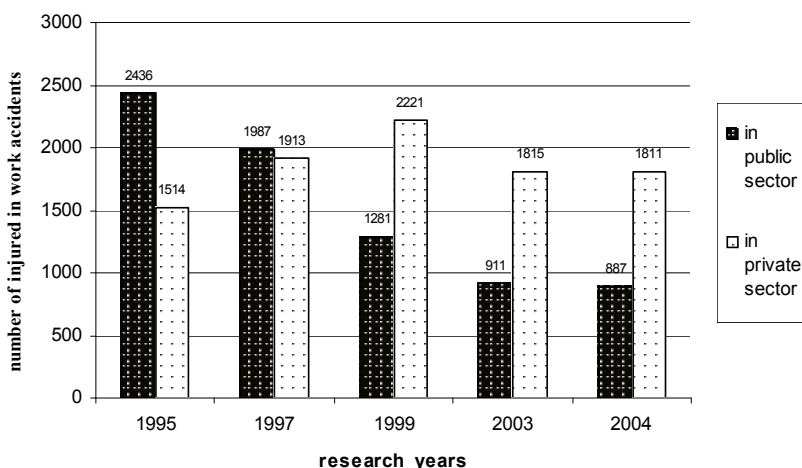
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<sup>15</sup> We have to mention, that because of formal changes introduced very often into these publications, the comparison research causes many problems.



**Pic. 2.3.** Number of injured in work accidents in Opole province in selected years. Self elaboration on the grounds of Opole province' statistical yearbooks

We can say that accident rate “in general” decreased in year 2004 comparing to year 1995 by 279 cases. Also accident rate decreased, it defines number of workers injured in accidents per 1000<sup>16</sup>. In 1995 accident rate was 16,9, in 2000 decreased to 15,1 and 10,9 in year 2003 [109;115].



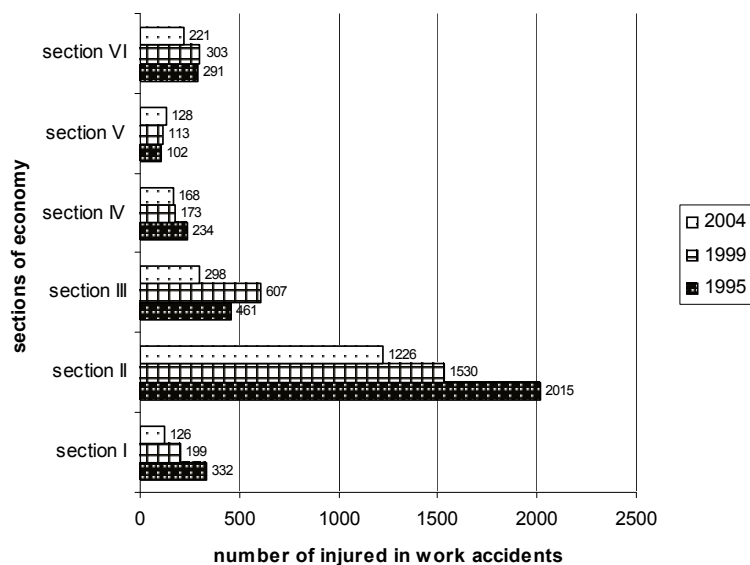
**Pic. 2.4.** Number of injured in work accidents in private and public sector in selected years. Self elaboration on the grounds of Opole province' statistical yearbooks

<sup>16</sup> The accident ratio is the number of person injured per 1000 persons employed. In calculating the ratio the average number of working persons was assumed, expressed as an arithmetic mean for two consecutive years, as of 30 IX and 31 XII i.e. from the reference year, without converting part – time paid employees into – full time paid employees. [101].

Picture 2.4. shows differences in accident rate in public and private sector of Opole province in examined years. We can notice that the number of injured in public sector in year 1995 exceeded number of injured in private sector by 1000. But from year 1999 the situation changed and private sector registered more injured in work accidents<sup>17</sup>.

The reason for this situation might be an improving privatization process and decreasing activity of public sector in our province. Starting with year 1999 we can notice a slow decrease in number of injured in work accidents in province's economy.

Reports concerning economy are divided into sections that include both economic entities and employees working there.



**Pic. 2.5.** Sections of economy in context of number of injured in work accidents in selected years. Self elaboration on the grounds of Opole province' statistical yearbooks. Indicators: I – agriculture, hunting and forestry; II – industry; III construction; IV – transport, storage and communication transport; V – education; VI – health and social services

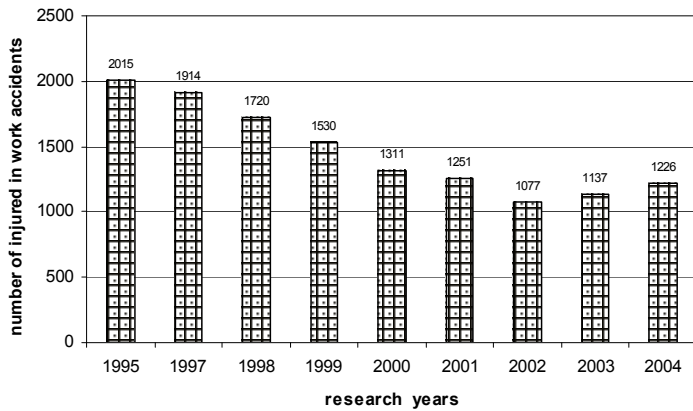
Picture 2.5. presents number of injured in six main sections of economy in Opole province in three analyzed years. Analyzing number of injured in these sections we can say that majority of injured are industrial work accidents victims, although even here in examined years we can notice decreasing tendency. In other sections the number of injured do not exceed 700, where the lowest accident rate can be found in education section.

<sup>17</sup> Private sector – grouping private national property (physical persons and other legal individuals), foreign property (foreign individuals) and mixed property with domination of private sector entity capital [116].



Analysis of statistical data of Opole province concerning “events and causes of work accidents” was delimited to one section – industry, which as mentioned above has the highest level of injured in work accidents.

Picture 2.6. presents information concerning number of injured workers in work accidents in Opole province industry. We can notice that although a decrease of accident rate in this economy section in the end of the 90’s of XX century, its level is still very high (over 1000 cases a year). Every work accident can be described in two categories – events and causes. An event is a kind of contact of human with the factor that caused an accident. The cause of accident can be deficiencies or irregularities connected with material environment factor, work stand organization or human mistake. It is assumed that every work accident is a result of one event, but an event can have even couple causes [111].



**Pic. 2.6.** Number of injured in work accidents in Opole province.  
Self elaboration on the grounds of Opole province’ statistical yearbooks

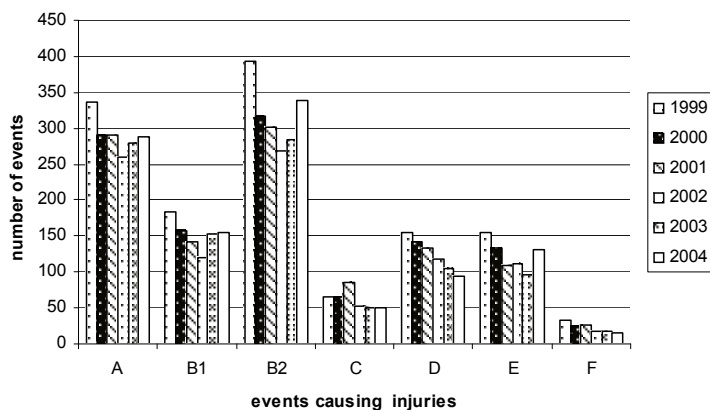
Work accidents are classified according to events that are “normal condition deviation”, “causing injury” and accident causes [116]. Picture 2.7 below presents information concerning events that caused industrial work accidents in Opole province between years 1999 – 2004.

Information included in statistical sources show that in examined period mainly following events were causes of the work accidents: „persons hit or crushed by moving material objects”, “falling material objects”, and “falls”. On the other hand such events as „persons hitting stationary material objects” and – “fires, explosions, natural disasters as well as failures of material objects” did not significantly influenced on injuries cases within this section.

Work accident can be a result of many causes, described by professional literature as TOL. Statistics describes 7 groups of causes<sup>18</sup>. Causes group T

<sup>18</sup> Seventh group of causes – technical causes – was obstacles on picture 2.8. due to technical issues.

(technical) includes „inappropriate condition of material objects/agents. Group O (organizational) includes following groups of causes: “inappropriate organization of work”, “inappropriate organization of work stand” and „absence or inappropriate use of material objects/agents”. Other causes L describe human factor.



**Pic. 2.7.** Number of events directly causing injuries in Opole province industry in selected years. Self elaboration on the grounds of Opole province’ statistical yearbooks.

Indicators: A – persons falling; B1 – persons hit or crushed by moving material objects; B2 – persons hit or crushed by machinery, equipment, tools as well as falling material objects; C – persons hitting stationary material objects; D – persons colliding with sharp material objects; E – effects of harmful chemical substances and other material agents; F – fires, explosions, natural disasters as well as failures of material objects

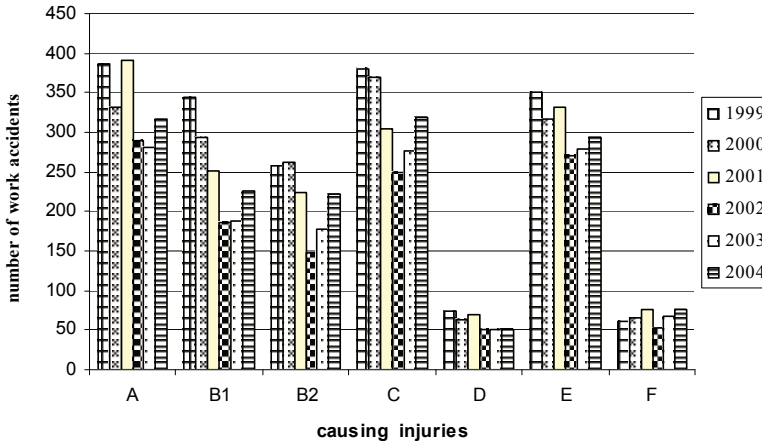
Picture 2.8. presents information concerning number of work accidents according to causes. Analyzing those data we can notice how crucial are technical and organizational causes, but mainly the consequences of human factor behavior. Picture omits “incorrect employee action” which dominates as a cause of work accidents; the number of accidents caused by it is 1456 in year 1999 and 1191 in year 2004 [111;116].

Comparing average number of work accident causes in examined years we can put them in following order:

1. „incorrect employee action” -average 1218;
2. inappropriate condition of material objects/agents – average 332;
3. – absence or inappropriate use of material objects/agents – average 317;
4. inappropriate willful employee action – average 307.

In the ranking above, a human factor has take first place and it has the greatest influence on creating events leading directly to work accidents. We can say that majority of work accidents victims in Opole province economy are people working in industry. Statistical data presented here concern workers – victims in whole economy of Opole province, excluding private farms in agriculture. Although the economic transformation improves, safety level in economy “in general” did not change for better in Opole province, the proof is the

increase of accident rate in private sector. Only in industry in examined period, a significant decrease of victim number can be noticed.



**Pic. 2.8.** Number of work accidents according to causes in Opole province industry in selected years. Self elaboration on the grounds of Opole province' statistical yearbooks.

Indicators: A – inappropriate condition of material objects/agents; B1 – inappropriate organization of work; B2 – inappropriate organization of work post; C – absence or inappropriate use of material objects/agents; D – not using protective equipment; E – inappropriate willful employee action; F – inappropriate mental – physical condition of employee.

It is necessary to mention that national economy bears very high costs of accidents at work. First expenses concern assuring the victim with first aid, treatment, transporting the victim to hospital and rehabilitation costs [21]. Second group of expenses includes pension provided to the victim and his family; amount of money depends on health loss percentage caused by accident. It can be classified as permanent health loss, long term one and can cause total inability to work, inability to live independent existence, worsened health loss or victim's death [31].

Single payments for accident's victims, occupational disease victims and deceased' family members increase in last month of every quarter. It increases for a percent depending on average monthly pay rise in recent quarter [30]. Moreover, costs of accidents include a value of not produced goods caused by unfortunate event, breaks in production and costs of qualifying new worker to take up the work position. Also costs of damaged machines, tools and materials, direct cost of providing first aid and removing accident's material losses have to be considered.

In the 90's of XX century a companies were offered to "additionally increase insurance premium" for 7% in case of work conditions deterioration<sup>19</sup>.

<sup>19</sup> I. Jędrasik – Jankowska, Rola prawa ubezpieczeń społecznych w zapobieganiu wypadkom przy pracy, *Bezpieczeństwo Pracy* 9 1995, s.4. [32]

Change and increase of insurance premium depending on occupational threats was supposed to decrease the accident rate and occupational diseases number [74;128].

## **Recapitulation**

Statistics concerning Opole province' work conditions does not allow to analyze details of occupational diseases, those information refer only to recent years. On this ground we can only say that numbers of new occupational diseases cases are equal to Polish tendencies only in case of vocal organ diseases.

Work conditions in Opole province can be concluded also from work accident rate; whereas this depends on changes in work conditions. In examined period, a comparison of work accident rate decrease with strenuousness threat should bring new questions concerning employers' credibility, since work accident causes serious financial consequences and reporting it brings increase of insurance premium.

To recapitulate we can say that:

1. number of work accidents victims decreased;
2. number of work accident victims in industry systematically decreases, where those changes are more visible in case Opole province (by around 1000 cases in examined period);
3. changes in labour protection changes influenced the decrease of accident rate; they made employers improve work safety within the works.

## Chapter 3

### NOISE AS A DOMINANT HEALTH THREAT

Noise is a factor, which is one of the greatest threats in work environment. It is considered that around 90% of work stands expose the worker to its influence. Each kind of noise is a threat because it is present in natural environment, living area and work environment, especially in industrial works. We can distinguish internal noise which is emitted by sources inside industrial halls and rooms as well as external noise emitted to environment around industrial works and communication arteries [25].

#### 3.1. Noise influence on human organism

Noise in work process is very often considered by workers as strenuous but not harmful; because they are not aware of long term consequences of being exposed to noise. Valuation of noise strenuousness level presented in table 3.1. was suggested in the 80's by S. Szumpich.

**Table 3.1.**

Suggestion of noise strenuousness level

| Lp.   | Threatening condition characteristics            | Noise strenuousness and harmfulness level |
|---|--|---|
| 1.  | Temporary * noise exposure, 60 – 90 dB intensity | minimal                                   |
| 2.  | Permanent** noise exposure, 60 – 90 dB intensity | low                                       |
| 3.  | Temporary noise exposure, 60 – 90 dB intensity   | medium                                    |
| 4.  | Permanent noise exposure, 90 – 110 dB intensity  | high                                      |
| 5.  | Permanent noise exposure, 90 – 120 dB intensity  | very high                                 |
| Indicators * temporary exposure – up to 4 hours; ** permanent exposure – over 4 hours |  |   |

Source: On the grounds [79].

Harmful noise influence on human organism depends on:

- Time of exposure (it cumulates within the time of exposure)
- Noise character; temporary, permanent or pulsating (pulsating noise is the most harmful),

- Noise frequency (the higher the frequency – the higher importance and harmfulness) [9]
- Noise influence on human organism is particularly complex [15].

Noise is a form of mechanical energy transmitted by spreading of an acoustic wave. In this form it reaches ear drum membrane, whose vibrations transmit it to the middle and inner ear where it can cause irreversible damages leading to hearing loss.

Human ear is a very sensitive and complex organ that allows us to receive sound impulses.

External ear, auricle; protects elements of inner and middle ear from damages. Those internal structures are located on both sides of human skull and connected by aural nerve with proper area of cerebral cortex. As an even organ it allows to establish distance and direction of sound and thanks to equilibrium organ located in cochlea it enables to determine body position and keeping body balanced while moving in upright position. Connections between Eustachian tube with oral cavity enables to balance an inside ear pressure in situations where noise intensity is too high; this protects inner ear structures [1]. Sound volume and time of noise exposure are very important. Human organisms' reactions to noise are various; some of sounds are perceived as pleasant and soothing (like classical music), other irritate (like sound of scratching the surface with a nail). The same sounds can be music for some people and sound cacophony – noise – for the others. Regardless of human brain interpretation, all high intensity noises can be a threat to human health. Immediate results of exposure to noise are so called „under hearing” symptoms such as:

- loss of concentration and ability to perform work tasks;
- longer reaction time to stimuli, it can be the cause of accidents,
- faster fatigue,
- problems with sleeping; falling asleep and going through all sleep phases without awakening

Consequences of long term and high intensity noise on hearing system:

- ear structure damages accompanied by various hearing loss levels; sometimes total hearing loss. Moreover; perforations or damages of ear drum membrane, breaking the chain of auditory ossicles, mechanical damages of base membrane and Corti organ structures (symptoms of acoustic trauma);
- hearing impairment without visible damage of anatomical elements. In this case decrease of hearing acuteness (result of long term exposure) [28].

Long term various intensity and frequency noise exposure initially causes hearing organ adaptation, then fatigue and in long distance – decreased hearing organ sensitiveness which results in increased auditory threshold. Hearing organ damage can be irreversible disability. Hearing loss level depends on exposure conditions and hearing organ overload. It is also determined by individual sensitiveness depending on genetic factors, sex and age [28].

The whole human organism reacts to noise. Research show that reaction to severe or chronic acoustic trauma can result in involuntary reactions such as

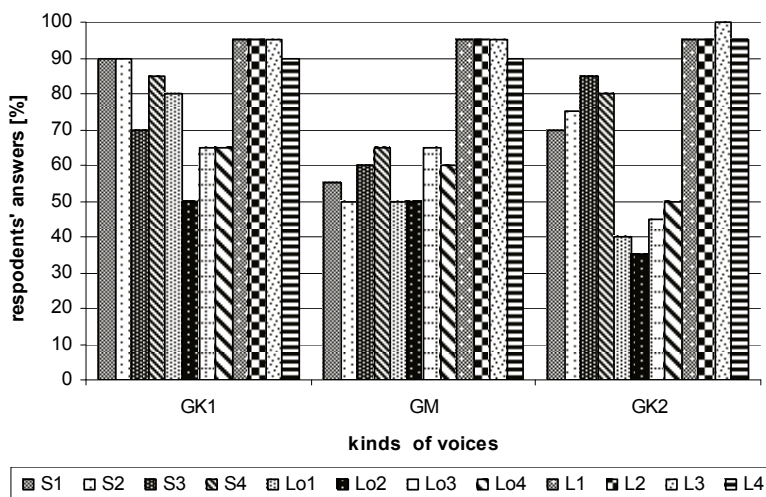
increased heart rate, breathing pace, blood pressure, digestion process or changes of skin temperature. Noise intensity higher than 150 dB can paralyze functioning of the organism – can cause nausea, lack of coordination depression and anxiety attacks. Therefore in case of this harmful factor we can be exposed not only to hearing loss but also as long term consequences – to nervous system damage and mental disorders [18].

Negative noise influence can also be observed in speech understanding ability. Noise intensity:

- 0 – 30 dB – enables to whisper,
- 30 – 55 dB – enables to talk at normal level,
- 60 – 75 dB – enables to communicate only with raised voice,
- 80 – 95 dB – impedes communication significantly,
- 95 – 100 dB – requires to shout to communicate,
- over 100 dB – makes communication impossible.

Moreover, noise influences our orientation in living environment and our feeling of independence and safety. An extensive noise decreases concentration level; noisy environment makes difficult to perform work tasks requiring high level of concentration – perception becomes disturbed because of longer time of complex reactions [9]. Working in environment where hygienic rules are constantly exceeded can cause high blood pressure disease, ulcerous and duodenum disease and neurosis. It was also proven that noise causes stress. It impairs communication between coworkers which makes noise one of main causes of accidents at work. That is the reason why knowledge of noise harmful influence on human organism should be essential for employers and employees to create safe work conditions.

A presentation of research result conducted at Opole University of Technology concerning the influence of white noise on perception of information and noise influence on communication process between people will be shown below [71].



**Fig. 3.1.** Respondents' answers concerning distinguishing words, logotoms and numbers. Kinds of voices: GK1 – female voice 1, GM – male voice, GK2 – female voice 2. Indicators: S1 – S4 words objects 1–4; Lo1 – Lo2 logotoms objects 1–4; L1 – L4 numbers objects 1–4

Picture 3.1. presents research results concerning the influence of white noise on perception of voice signal in form of words, logotoms and numbers<sup>20</sup>. White noise is a noise similar to white light because in both white noise and white light the energy spreads equally within the whole spectrum. White noise spectrum has the same energy on all frequency band.

In the first phase of research, a white noise was on the same level as a signal. It turned out that in this case given words, logotoms and numbers are completely covered by noise, making them difficult or impossible to perceive. Understanding logotoms was causing the biggest problem. The reason for this is that people in casual conversations do not use them, therefore they had so many problems with understanding them. Understanding numbers did not cause many problems. Even after hearing part of the number read by researcher – they were able to associate the missing part. Understanding words turned out to be on medium level. Words were constructed the way so as while hearing part of the word – the person should easily associate it with similarly sounding word; for example given word “map” and word “gap” that should be answered in the condition of white noise presence.

In white noise presence conditions, the female voice 1 was easily recognized. Examined persons heard around 75% of all signals read by this voice. Male voice obtained the worst results; 57% of signals read by this voice were recognized. Therefore we can say that the male voice was better masked by

<sup>20</sup> Logotoms – parts of word that are not phones or syllables. Examples of logotoms are GET, NES, JON, SAF, GOT, JET [71].



white noise used in research. Female voice 2 had 70% of correct answers. The reason for this might be the fact that female voice 2 was presented in the research in the end, so the examined persons could feel fatigue caused by white noise influencing their concentration level and giving incorrect answers.

The second phase of research concerned how the white noise on higher level than signal level will influence perceiving information. It turned out that white noise completely masked signal and examined persons were unable to understand words, logotoms and numbers at all. Undoubtedly both, white noise and three voices' spectrum had an influence on results. Human speech embraces the frequency from 100 Hz to over 8kHz. Human ear perceives signals with more extensive frequency and perceiving boundaries depend on individual features. Typical perception range for human ear is from 20 Hz to 15 kHz (sometimes up to 20 kHz) and the highest acuteness is 1 kHz to 3 kHz.

Conducted research show how crucial is the role of acoustic background and ability to perceive sounds for correct understanding of the acoustic signal. „Noise” in communication theory means any disturbance of perceiving sounds; it is a crucial communication barrier.

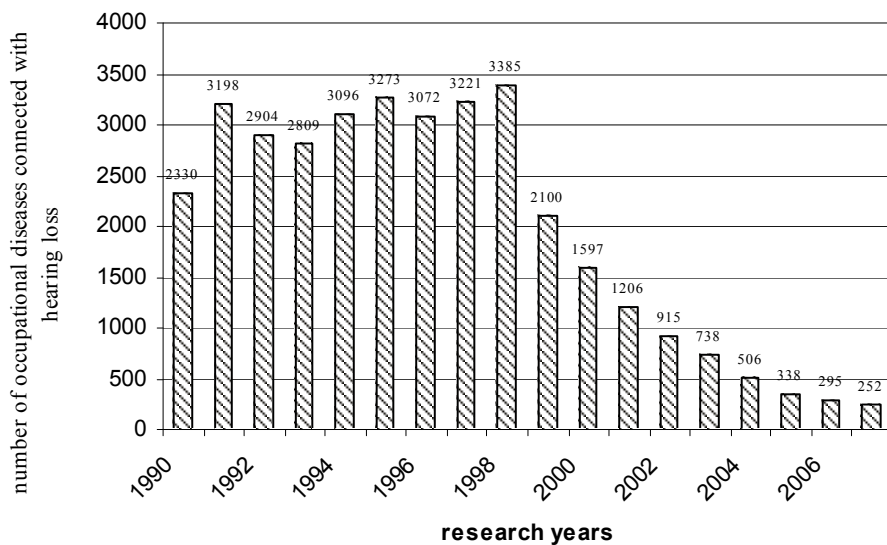
### **3.2. Evaluation of noise threat in national economy**

On the grounds of statistical data analyzed we can say that the number of occupational diseases connected with hearing loss and inducted by noise in examined period has decreasing tendency, although it is still on the top of occupational diseases ranking along Poland. Noise as a cause of occupational hearing loss is included in special group of occupational diseases (such as chronic diseases of locomotor system related to the way the job is performed and excessive overload) that do not concern only one specific profession. Common exposure to noise concerns workers of many industry branches, thus it is dangerous for numerous groups of workers.

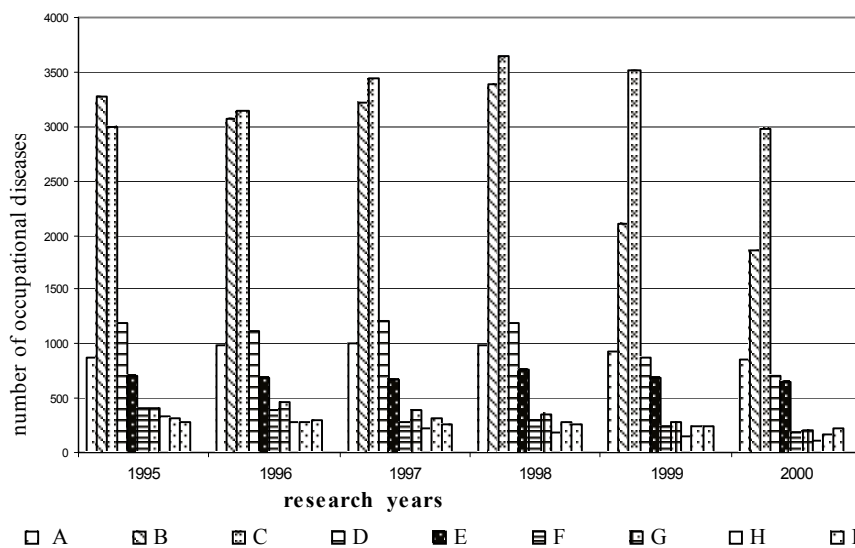
Statistical data referring to occupational diseases in Poland between 1990 – 1998 prove that “hearing damage caused by noise influence” was the main reason of stating of occupational diseases among employers working in national economy and industry.

In the beginning of XXI century the number of new cases of occupational diseases concerning hearing loss decreased from over 3000 new cases a year to around 300; it is presented on picture 3.2. Between years 2003 – 2007 these numbers decreased even more. Following pictures 3.3. and 3.4. show numbers of cases of occupational diseases in Poland from year 1995 to 2007. We can observe how the most common occupational diseases hierarchy changes in Poland.

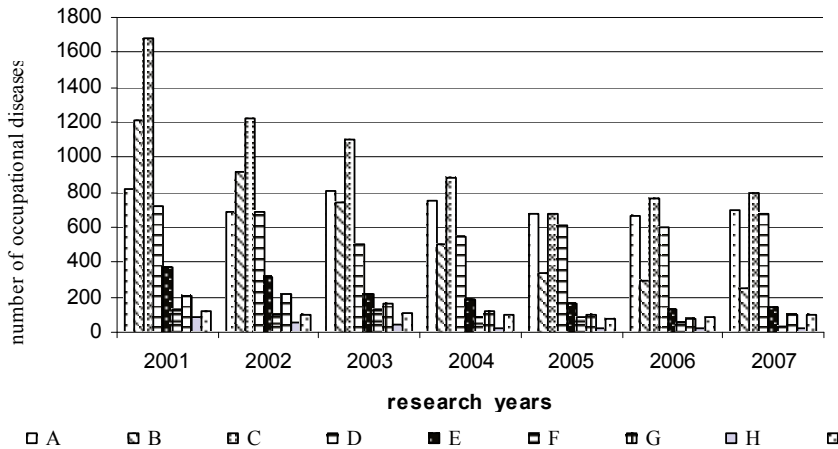
You can observe consecutively decrease of number of hearing damage after 1998 [64]. Hearing organ diseases are situated next to “chronic diseases of vocal organs” on the top of occupational diseases hierarchy up to year 2002 (pic. 3.3.).



**Pic. 3.2.** Number of occupational diseases connected with hearing loss between 1990 – 2007. Self elaboration on the grounds of GUS statistical yearbooks



**Pic. 3.3.** Number of occupational diseases cases in Poland between years 1995 – 2000. Self elaboration on the grounds of GUS statistical yearbooks. Indications for pic.3.3. and 3.4.:  
 A – pneumoconioses, B – noise induced hearing loss, C – chronic diseases of vocal organ, D – contagious and invasive diseases, E – dermatoses, F – acute and chronic intoxications, G – vibratory syndrome, H – chronic bronchitis, I – chronic diseases of locomotor system, J – chronic diseases air passages



Pic. 3.4. Number of occupational diseases cases in Poland between years 2001 – 2007.  
Self elaboration on the grounds of GUS statistical yearbooks

In the beginning of XXI century the number of new cases of various groups of occupational diseases decreased below 2000 and still systematically decreases. This can be a proof that in this long period of time work conditions improved resulting in decreasing number of new cases of occupational diseases including “noise induced hearing loss”.

### 3.3. Evaluation of noise threat in Opole province

#### 3.3.1. Noise threat in industry and its branches in years 1985 – 1994

Analyzing statistical data concerning numbers of employees working in noise threat conditions, we can see how serious exposure to noise for their health is. Results of research conducted in industrial works of Opole province are presented below. At first, research results concerning this harmful factor in last years of socialist economy and its influence on undergoing changes connected with it will be presented.

Data presented in table 3.2. concerning noise as a harmful factor can be a proof of crucial role it has in work safety and influence it has on workers’ health. Presented data concern number of workers in comparison to number of workers employed in general in selected industry branch, who are exposed to noise level exceeding hygienic rules and regulations  $W_{ZCX}$  [15].

Between 1985 – 1989 number of employees exposed to noise threat in industry “in general” remained at the same level. However, only in case of fuel, metal and transport industry the number of workers exposed to noise slightly decreased. In other industry branches this number increased; in textile industry in 1989 over 70% of workers were exposed to this factor.

**Table 3.2.**

Number of workers exposed to noise (“person threaten”) present at selected industry branches in Opole province in last years of socialist economy

| Industry branches        | years |      |      |      |      |
|--------------------------|-------|------|------|------|------|
|                          | 1985  | 1986 | 1987 | 1988 | 1989 |
| “person threaten” in [%] |       |      |      |      |      |
| fuel                     | 3,1   | 3,9  | 2,7  | 3,6  | 1,9  |
| energetic                | 46,5  | 47,4 | 67,3 | 51,6 | 50,9 |
| metal                    | 39,1  | 39,5 | 39,2 | 37,9 | 36,8 |
| machine                  | 24,1  | 30,2 | 32,0 | 26,8 | 28,4 |
| means of transport       | 24,2  | 23,6 | 17,4 | 15,5 | 23,8 |
| building material        | 24,0  | 24,1 | 23,9 | 25,2 | 30,2 |
| wood and paper           | 11,4  | 17,6 | 18,5 | 21,9 | 20,9 |
| textile                  | 61,4  | 60,3 | 61,9 | 63,3 | 70,8 |
| leather                  | 8,0   | 42,5 | 39,9 | 36,6 | 40,8 |
| food                     | 24,6  | 30,3 | 25,7 | 28,3 | 25,5 |
| Industry in general      | 34,0  | 35,3 | 34,9 | 33,5 | 34,3 |

Source: Self calculation on the grounds of Z-10 report

**Table 3.3.**

Number of workers exposed to noise (“person threaten”) present in selected industry branches in Opole province in the beginning of transformation period

| Industry branches        | years |      |      |      |      |
|--------------------------|-------|------|------|------|------|
|                          | 1990  | 1991 | 1992 | 1993 | 1994 |
| “person threaten” in [%] |       |      |      |      |      |
| fuel                     | 17,9  | 9,7  | 14,1 | 10,5 | 13,2 |
| energetic                | 49,1  | 46,1 | 47,5 | 38,8 | 41,0 |
| metal                    | 38,3  | 37,1 | 40,0 | 37,5 | 32,3 |
| machine                  | 31,2  | 34,9 | 36,1 | 37,2 | 39,6 |
| means of transport       | 24,0  | 26,0 | 32,0 | 60,5 | 49,3 |
| building material        | 32,5  | 34,2 | 31,4 | 33,8 | 35,2 |
| wood and paper           | 53,5  | 54,0 | 56,2 | 38,6 | 44,6 |
| textile                  | 74,0  | 76,2 | 81,1 | 82,1 | 87,8 |
| leather                  | 52,9  | 56,7 | 53,7 | 48,0 | 49,5 |
| food                     | 25,7  | 30,6 | 32,8 | 30,8 | 36,5 |
| Industry in general      | 36,5  | 36,4 | 38,1 | 40,6 | 40,7 |

Source: Self calculation on the grounds of Z-10 report

The situation has changed after implementing market economy. As data presented in table 3.3. show, in years 1990 – 1994 the number of workers exposed to noise in industry “in general” was systematically increasing. The highest increase percentage can be found in such industry branches as textile, leather

and transport. Situation in textile branch deteriorated; number of exposed workers increased to 88%. Slight improvement can be found in fuel, energetic and metal branch and significant improvement took place in wood industry.

Number of workers hired in conditions where hygienic norms were exceeded (according to Z-10 reports) reflects work safety level. The highest the percentage of workers exposed to harmful factors; in this case noise, the highest probability of health loss or health permanent deterioration.

### 3.3.2. Noise threat in selected industry works in years 1995 – 1999

Work conditions in 15 industry works of Opole province representing earlier examined industry branches have been analyzed. Evaluation has been conducted on the grounds of Z-10 reports' analysis obtained from those industry works [18]. Research period last for 5 years. A dominating phenomena in the 90's of XX century was the decrease of employed workers (tab. 1.1) oscillating from 6 – 98%. The greatest employment decrease (by 98%) took place in chemical branch, by 62% in wood, by 55% in metal and by 49% in one of examined industry works of electro – engineering industry [18]. Table 3.4. presents threat scale of workers exposed to noise in selected industry branches in relation to number of employees.

**Table 3.4.**

Number of workers exposed to noise (“person threaten”) present at selected industry branches in Opole province in years 1994 – 1999

| Industry branches and industry works belonging to them | years                    |      |      |      |      |      |
|--|--------------------------|------|------|------|------|------|
|  | 1994                     | 1995 | 1996 | 1997 | 1998 | 1999 |
|  | “person threaten” in [%] |      |      |      |      |      |
| Fuel – energetic (z.1)                                 | 3,6                      | 4,4  | 3,9  | 5,0  | 6,3  | 5,3  |
| Fuel – energetic (z.2)                                 | 7,9                      | 6,1  | 6,2  | 5,4  | 4,1  | 4,6  |
| Metal industry (z.3)                                   | 21,9                     | 22,7 | 24,8 | 25,1 | 25,1 | 35,0 |
| Electro – engineering (z.4)                            | 14,8                     | 18,1 | 24,7 | 25,6 | 24,3 | 24,1 |
| Electro – engineering (z.5)                            | 4,3                      | 10,1 | 15,2 | 16,7 | 0,4  | 0,8  |
| Electro – engineering (z.6)                            | 10,6                     | 10,8 | 10,1 | 12,9 | 13,5 | 15,5 |
| Electro – engineering (z.7)                            | 3,6                      | 1,7  | 6,9  | 8,7  | 6,1  | 6,7  |
| Chemical (z.8)   | 1,8                      | 1,9  | 3,6  | 9,5  | 3,2  | 0    |
| Chemical (z.9)   | 0,8                      | 0,7  | 1,6  | 4,1  | 3,2  | 5,1  |
| Mineral (z.10)   | 8,4                      | 8,6  | 8,6  | 5,0  | 6,2  | 3,4  |
| Mineral (z.11)   | 3,6                      | 3,7  | 4,0  | 3,4  | 2,8  | 2,1  |
| Wood and paper (z.12)                                  | 12,4                     | 11,2 | 11,5 | 12,5 | 13,2 | 13,8 |
| Food (z.13)  | 21,7                     | 15,8 | 5,4  | 9,2  | 4,4  | 6,9  |
| Food (z.14)  | 14,3                     | 11,1 | 11,2 | 11,9 | 12,7 | 15,5 |
| Food (z.15)  | 6,5                      | 15,6 | 7,5  | 9,1  | 11,8 | 12,2 |

Source: Self calculation on the grounds of Z-10 report. Abbreviations such as “fuel – energetic”(1) should be read as production unit 1 from fuel – energetic industry branch

On the ground of obtained results we can conclude that there are significant differences in noise threat exposure not only in selected industry branches but also between selected industry works. Table 3.5. presents the dynamics of this phenomena for those selected industry works. Work environment harmful conditions threat indicator was used to calculate visual coefficient, which can be a starting point for evaluation of work conditions changes that took place in selected industry works and industry branches after period of social, economic and political transformation in Poland. Year 1994 as a year closing the first phase of system transformation in Poland was taken as a point of reference.

**Table 3.5.**

Visual coefficient values in reference to year 1994 – noise threat in year 1995 – 1999 in selected industry works of Opole province

| Production units according to industry branches | years                   |      |      |      |      |
|---|-------------------------|------|------|------|------|
|   | 1995                    | 1996 | 1997 | 1998 | 1999 |
|   | WsP <sub>1994</sub> [%] |      |      |      |      |
| Fuel – energetic (z.1)                          | 120                     | 107  | 137  | 172  | 147  |
| Fuel – energetic (z.2)                          | 78                      | 79   | 69   | 51   | 60   |
| Metal industry (z.3)                            | 104                     | 114  | 115  | 115  | 160  |
| Electro – engineering (z.4)                     | 124                     | 168  | 174  | 165  | 164  |
| Electro – engineering (z.5)                     | 232                     | 352  | 385  | 10   | 17   |
| Electro – engineering (z.6)                     | 102                     | 95   | 122  | 1    | 146  |
| Electro – engineering (z.7)                     | 48                      | 193  | 244  | 170  | 188  |
| Chemical (z.8)                                  | 106                     | 199  | 532  | 178  | 0    |
| Chemical (z.9)                                  | 86                      | 200  | 513  | 394  | 635  |
| Mineral (z.10)                                  | 104                     | 103  | 59   | 74   | 41   |
| Mineral (z.11)                                  | 108                     | 111  | 94   | 79   | 57   |
| Wood and paper (z.12)                           | 91                      | 93   | 101  | 106  | 111  |
| Food (z.13)                                     | 73                      | 25   | 42   | 20   | 32   |
| Food (z.14)                                     | 78                      | 79   | 89   | 89   | 86   |
| Food (z.15)                                     | 24                      | 114  | 139  | 181  | 187  |

Source: Self calculation on the grounds of Z-10 report

We can say that exposure to excessive noise took place in examined period in 8 out of 15 industry works of Opole province. Moreover, we should remind that Silesia' region industry works because of financial problems in this period were cutting down the employment level. However, it did not have influence on work conditions in those works. Work environment conditions evaluation presented for selected industry works using harmful factor indicator such as noise can bring the following conclusions:

- there are significant differences between particular groups of industry branches;

- a significant fluctuations  $W_{ZCS}$  [from 0 to 35% (“person threaten”)] indicator took place in examined period;
- the highest noise threat can be found in metal industry works, in some electro – engineering industry works, in three food industry works and wood and paper industry.

Analyzing the dynamics of changes of noise threat in selected industry works we can notice significant differences of visual coefficient values and its fluctuations. Noise threat decreasing tendency can be noticed only in seven industry works. Cases of increase of visual coefficient value  $W_{SP_{1994}}$  show five – times or over six – times increase of the number of workers threatened by noise in comparison to year 1994.

### 3.3.3. Noise threat in selected industry branches

Noise, a harmful factor for human health is one of the most commonly present factors in production units of wood industry. Technological characteristics of wood processing is crucial for noise threat dynamics. Characteristics of two examined production units mentioned in chapter 1 presents noise sources and workers’ evaluation pointing at noise as a harmful factor present at their work stands [61].



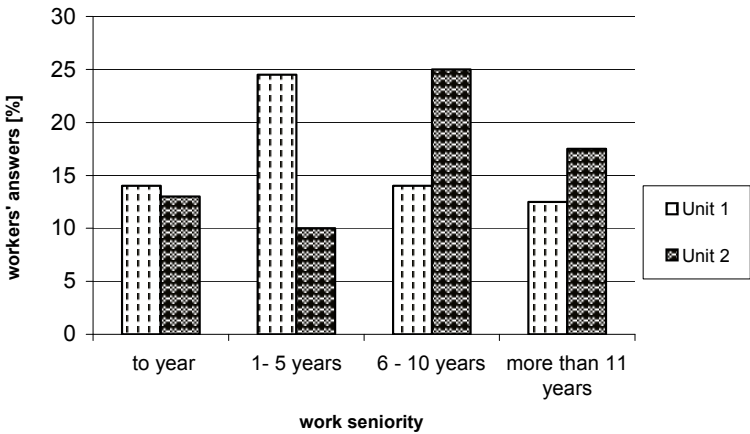
**Pic. 3.5.** Workers’ answers depending on their work seniority concerning noise as a harmful or dangerous factor.(Production unit 1 – Furniture production; Production unit 2 – Building industry).

Picture 3.5. presents answers of the workers who indicate noise as a harmful or dangerous factor present at their work stands.

Workers, especially those with long work seniority realize that noise influence on hearing organ cumulates within the years of work. If the noise is so intensive that human ear has not enough time to regenerate, a permanent hearing deterioration can take place. We can notice that in production unit 1 the most

numerous group of workers with work seniority (1-5 years and 6 – 10 years) is fully aware of noise presence in their work environment. It can indicate that the employer puts an effort to inform his workers about harmfulness of factors present in their work. Workers with shorter work seniority are usually apprentices and their knowledge concerning noise harmfulness is very poor. The problem might be also the trainings conducted within production units. In production unit 2 on contrary to production unit 1; the most numerous group of workers considering noise as a harmful factor are workers with seniority over 11 years.

Picture 3.6. presents workers’ opinions concerning noise as a factor obstructing and disorganizing performing work tasks and duties.



**Fig. 3.6.** Answers of workers concerning noise as a strenuous factor during performing work tasks, taking into consideration their work seniority (Production unit 1 – Furniture production; Production unit 2 – Building industry).

Noise is an obstacle for performing work duties for over 60% of respondents. Taking into account work work seniority of those production units employees we can notice that again; in case of production unit 1 24% of workers with work seniority 1-5 years consider noise as strenuous factor and in case of production unit 2 the most numerous group of workers (25%) represents work seniority lasting 6 – 10 years. Moreover, in case of production unit 1 we can notice that slightly more respondents consider noise as a more strenuous than harmful or dangerous factor.

Employers should realize that noise as an harmful factor should by all means be limited to specific hygienic norms or if it not possible – they should protect the workers by providing them with essential individual protection means. In both production units, the most common way of decreasing noise level is limiting its emission at the point of its source. So as to achieve it, a regular control of machines’ technical conditions is being conducted; greasing parts and tightening up loose parts of the machines is the most common.



### 3.4. Society's knowledge concerning noise as a dangerous factor and its influence on human health

As we mentioned before, noise presence is so common that we often do not realize its presence and influence. However, either we notice it or not – it influences on individuals' and society' health. Particularly sensitive to noise are children and especially pupils, very often not aware of its harmfulness. Educating them about noise influence can result in creating fully aware workers, having a knowledge of such threats. This knowledge will give them grounds for attempts to eliminate or at least to delimit their exposure to it, will also convince them to use individual protection means.

Following chapter will present selected research results conducted among children and teenagers from different schools located in towns with various population.

Problem does not concern only elementary schools where children 'let off steam' during breaks but also over elementary schools such as gymnasiums. In those, the noise might not only be caused by other participants of a didactic process but also, in case of trade schools, by devices used for technological purposes. Noise in schools is not only present inside of school buildings but also outside, caused by location of the school.

All participants of didactic process are exposed to noise – students, teachers and other school staff members. Young person do not realize he or she is the main source of school noise. However his situation differs from teachers and other staff members situation with time of exposure to noise in school environment. Teachers usually spend 30 years of work in environment where noise level exceeds sometimes even 85dB, that is why they are the most affected by noise exposure usually after they got retired; sometimes it happens earlier. Table 3.6. presents results of noise measurements in this environment.

The highest noise level (81 dB) was measured in one of examined schools in classroom, at the open window, from the playground side [17]. This level is higher than level measured during classes in sewers room while the machines were on. Conducted noise level measurement do not exceeds acceptable norms.

**Table 3.6.**

Noise intensity measurements in selected areas

| Location               | Measurement area | Measurement conditions              | L <sub>a</sub> [dB]* |
|------------------------|------------------|-------------------------------------|----------------------|
| Sewers workshop        | Sewers room      | Machines off                        | 65,3                 |
|                        |                  | Classes with old machines on        | 75,5                 |
|                        |                  | Classes with a few new machines on  | 67,0                 |
|                        |                  | Classes with set of new machines on | 71,2                 |
| Students changing room |                  | Clothes collection area             | 80,2                 |

| Location        | Measurement area                   | Measurement conditions | L <sub>a</sub> [dB]* |
|-----------------|------------------------------------|------------------------|----------------------|
| Common room     | at the entrance                    | During activities      | 59,2                 |
|                 |                                    | During break           | 72,5                 |
|                 | middle part                        | During activities      | 60,2                 |
|                 |                                    | During break           | 78,0                 |
| Teachers lounge |                                    | During classes         | 57,5                 |
|                 |                                    | During break           | 62,0                 |
| Classroom       | 1st floor from the parking side    | At the entrance        | 58,0                 |
|                 |                                    | At the open window     | 62,0                 |
|                 | 1st floor from the playground side | At the entrance        | 59,5                 |
|                 |                                    | At the open window     | 70,2                 |
|                 | 2nd floor from the parking side    | At the entrance        | 61,2                 |
|                 |                                    | At the open window     | 68,0                 |
|                 | 2nd floor from the playground side | At the entrance        | 64,3                 |
|                 |                                    | At the open window     | 72,0                 |
|                 | 3rd floor from the parking side    | At the entrance        | 61,5                 |
|                 |                                    | At the open window     | 69,0                 |
|                 | 3rd floor from the playground side | At the entrance        | 76,0                 |
|                 |                                    | At the open window     | 81,0                 |
| Hall            | I floor                            | During break           | 80,0                 |
| Hall            | II floor                           | During break           | 78,5                 |
| Hall            | III floor                          | During break           | 77,7                 |

\* – L<sub>a</sub> – Noise level

Source: Author's research [17].

A supplement for noise threat evaluation could be opinions of pre reproductive population concerning this harmful factor. Research has been conducted in 2009 in chosen elementary schools and gymnasiums in Opole [64]. Research subject was estimation of students' knowledge of noise sources and awareness of how threatening this factor is. Examined students at the age of 11 in elementary schools and at the age of 15 in gymnasiums.

In both cases schools were situated in city centre, which was the cause of a constant communication noise; examined students were fully aware of this fact. Students were estimating the noise level during classes; around 60% of respondents state the level is medium level which (estimated by over 60% of students attending both schools) do not disturb them, They also admit that their conversations during classes are the main source of noise, only some of them indicate outside noise as a main source (street, hall, other classrooms).

Breaks at schools are very often the only chance for children to meet their friends, so it is normal that they behave very noisy. At the same time there are

many children on limited area, this causes the need to communicate louder to hear each other. It is very common especially among younger children, it is visible in research results.

Although students admit that noise during breaks is intensive (84% in elementary and 73.5% in gymnasium schools), however most of them do not perceive it as disturbing.

Only some (6% of elementary school students and 8% of gymnasium students) realize that noise during breaks has a negative influence on their well being, regeneration and fatigue.

Students were asked about the highest noise intensity places, elementary school students consider concerts as the noisiest places (40%), while gymnasium students indicate school (39%).

Clubs are considered as the noisiest place by 24% of elementary school students and by 16% of gymnasium students.

Street is considered as the noisiest place by 8% of elementary school and 12% of gymnasium students. 2% of elementary school students state their homes are the most noisy places.

Students, not only gymnasium students, attend clubs and concerts where they can be exposed to high noise intensity. They also use portable music players. Most of students (over 60%) declares listening to music for more than hour a day; however 30% of elementary and 27% of gymnasium students listen to music for less than and hour a day.

Mentioned portable music players are built into mobile phones and 50% of examined students use them. 46% of elementary school students and 41% of gymnasium students use music players different then built in mobile phones.

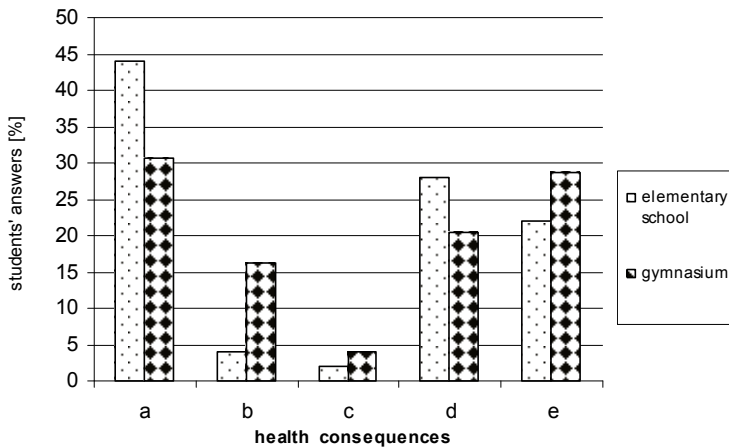
Using portable music players usually involves using headphones; most of them use internal headphones; 64% of elementary and 67% of gymnasium students use them; the reason of their popularity is the fact they are smaller and easier to carry.

Over 60% of examined students in both types of schools listens to the loud music, although (80% of elementary and 71% gymnasium students) they state the are aware of health consequences caused by listening to the loud music.

Further questionnaire questions verified their awareness of noise harmfulness.

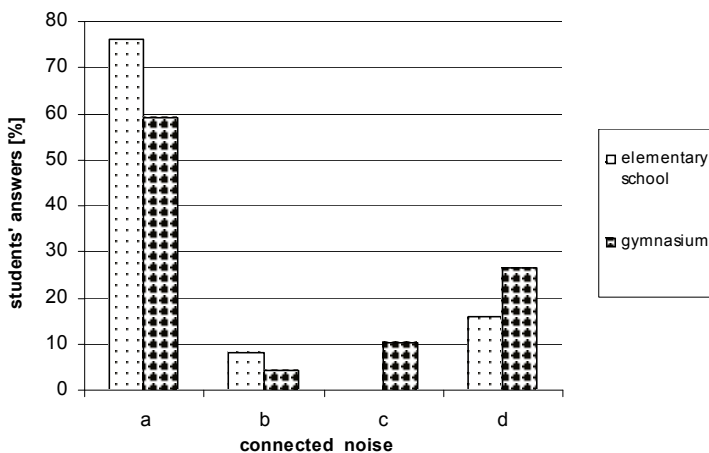
It turned out that 60% of elementary and 53% of gymnasium schools students were informed about influence of excessive noise on human organism. Most of students found out about noise harmful influence in schools, some of them from their parents, TV or internet.

Picture 3.7. presents students' answers concerning their knowledge of noise threat in school and in there homes [64]. According to students, the main consequence of noise exposure might be problems with concentration and direct hearing organ damage. Excessive noise in human environment can have an influence on learning process and lead to many health consequences, students do not realize that.



**Pic. 3.7.** Students' answers concerning health consequences connected with noise exposure. Indicators: a – problems with concentration, b – study problems problem, c – irritation, d – voice reception problems, e – irreversible harm to hearing organs

Further results are presented on picture 3.8. [64]. In opinion of students, a permanent, excessive noise influences negatively mainly on hearing system; 76% of elementary and 59% of gymnasium school students share this opinion. However, an excessive noise influence on nervous and digestive system is realized by few respondents from both schools.



**Pic. 3.8.** Students' answers concerning health consequences connected with noise. Indicators: a – influences negatively on hearing, b – influences negatively on nervous system, c – influences negatively on digestive system, d – causes permanent hearing damage

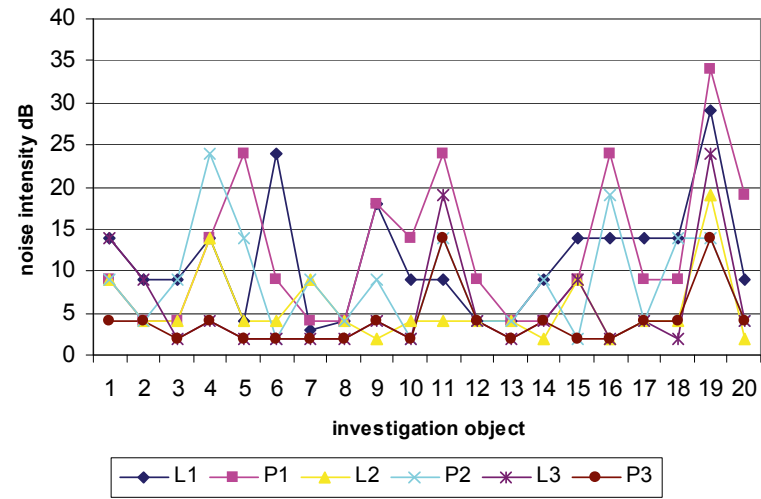
Obtained results show how not sufficient students' knowledge is; it is also clear that that young people spend too much time listening to the loud music and

attending music concerts. Using portable music players and headphones is highly risky and common as well.

Noise level in classrooms very often exceeds acceptable norms and on during breaks in school corridors it exceeds it significantly. Children and youth growing up in noisy environment are not able to receive full range of speech sounds and because of it what they hear might be distorted and not clear. Such situation decreases educational effect, lacks of vocabulary, speech impediments and not proper communicating.

Excessive noise health consequences are not sudden, that is why prevention is so important. Schools as well as media should provide students with information on noise influence; it would allow the students to estimate the risk and help them to avoid it. Otherwise this generation, will enter their adulthood with partly impaired hearing system.

That is the reason why other researches (results are presented below) concerned determining an auditory threshold of people of the age 23 – 25 [82]. Research was conducted in Material Work Environment Engineering of Technical University of Opole. Measurements' results are presented on picture 3.9.



**Fig. 3.9.** Noise intensity and its perception by respondents; depending on noise frequency. Indicators: L1 – Auditory threshold for left ear; frequency 125 Hz, P1 – Auditory threshold for right ear; frequency 125 Hz, L2 – Auditory threshold for left ear; frequency 500 Hz, P2 – Auditory threshold for right ear; frequency 500 Hz, L3 – Auditory threshold for left ear; frequency 3000 Hz, P3 – Auditory threshold for right ear; frequency 3000 Hz

Each respondent's auditory threshold was examined; for both, left and right ear; following frequencies were presented: 1000 Hz, 2000 Hz, 3000 Hz, 4000 Hz, 6000 Hz, 8000 Hz and then 1000 Hz, 750 Hz, 500 Hz, 250 Hz, 125 Hz. Tone intensity of presented acoustic signal on selected frequencies was displayed by 2-5 dB and being stopped after the respondent was informing that he

heard it. Time of measurement on various frequencies lasted on average 8 minutes. Obtained auditory threshold results were put on audiogram.

Analyzing obtained data concerning auditory threshold for selected frequencies we can say that sound signals of intensity from 2 dB – 15 dB are received the most accurate as well as frequency – 3000 Hz. 125 Hz frequency was causing the most problems with sound perception. On the grounds of the research we can conclude that people of age range 23 – 25 receive better higher than lower frequency sounds. Slight declinations in perception on selected frequencies could be caused by respondents' fatigue or lack of concentration during research [82].

Obtained results prove that age group 23 – 25 suffers from slight hearing deficiency; they have problems with receiving quiet or distant sounds.

## **Recapitulation**

Work conditions deterioration caused by noise influences negatively on workers psycho – motor abilities and on work performance quality by:

- slower thinking processes and decreasing its processes,
- memory deterioration, perception and orientation,
- longer reaction time for any signals coming from work environment etc.

As a consequence, we can observe increase of work accident rate, machines failures and decrease of work efficiency and quality. Long time consequences for production unit caused by noise exposure bring such economic consequences as:

- absence from work caused by occupational diseases,
- welfare connected with health loss,
- necessity of higher salaries paid to workers because of working in hazardous conditions.

Thus, facing such significant health losses, economic and social consequences – certain changes have to be implemented in companies to provide workers with safe work environment. To eliminate health threat exposure in industrial units, various organizational and technical improvements should take place. Examples of these improvements can be relocating workers further from highest noise level places, isolating noise sources and using protection means in case other solutions are impossible.

Implementing solutions against noise and muffling the noisiest machines brings sudden noise level decrease and directly influences increase of work safety level. Indirectly it brings less health loss and improves work efficiency [71]. Noise protection and prophylaxis includes:

- noise analysis within the work place,
- reduction of noise sources by using proper technologies and materials,
- using modern insulating materials,
- isolating machines and devices – outside steering,

- using hearing organ protection means,
- limiting time of exposure [81].

The only solution is to implement work environment quality procedure which in practice means using TQM (company managing concept) procedure. Among others, TQM puts emphasis on improving production processes and services' conditions. BHP (work safety and hygiene) system based on ISO 18001 also aims at decreasing direct and indirect losses caused by improper work safety and hygiene conditions.

In case of noise there are many possibilities of limiting or sometimes even total eliminating its influence on workers health by using at least individual protection means. Financial costs of this protection means will pay off in short period of time [72]. It is confirmed that decreasing noise level present at the work stand by 1 dB makes work efficiency increase [36]. Moreover, social costs connected with health welfare will lower because the number of occupational diseases caused by noise will decrease.





## Chapter 4

# HEALTH THREATS CAUSED BY WORK CONDITIONS IN OPINION OF VARIOUS PROFESSION WORKERS

This chapter presents selected research results conducted among various professions. The goal of this research was to find out how workers perceive their work environment as well as how they estimate its work safety. Safety threats; not only caused by work conditions but also by the manner of performing it while psychological burden are a common denominator for selected professions. Thus, in this chapter the examples of safety threats caused by various situations and psychologically overwhelming factors will be presented.

Professional literature states that in recent years occupational stress is more and more common and objective indicators prove its influence on health [69]. Stress at work, especially stressful situations present for instance in teachers and health services work influence both everyday life, performed work and attitude towards the work. Stress and ways of dealing with it are one of the most important problems in professions where the worker is facing other people directly, such as students, patients, clients or passengers.

Stress causes not only psychological discomfort – it can also cause psychosomatic diseases, behavioral disorders; it can also be the cause of problems with adaptation to environment [52]. Thus, the stressful situation influences physiological changes in the human organism, which in long term can lead to illnesses. Moreover, it can influence on the way of perceiving the workers himself and surrounding environment which is a psychological influence as well as individual's functioning in work environment. Chapter 3 focuses on noise factor and its influence on human health. We should mention that harmful factor is treated by an organism as a threat and causes stress.

### 4.1. Work safety and health threats in medical services

Nowadays hospitals; and especially hospitals providing complex diagnostics, with many various units are places where work conditions are very differentiated. The reason for this is that modern medicine uses specialist technological equipment [22]. Moreover, hospitals hire more women than men; female employees are different age (women who plan getting pregnant, women on the

menopause phase). Problem of work safety in such places focuses mainly on women health protection; the harmful factors present in medical units are:

- biological material,
- organic solvent, dangerous chemical substances, synthetic hormones,
- radiation, X – rays, radioactive isotopes
- electromagnetic fields [43].

Coming out of new diseases that can be compared to old days epidemics, threatening not only employees working in higher risk condition but also persons that contact with infected individuals. Those diseases and (caused by financial problems) insufficient work conditions level in hospitals should be the reason for interest with this problematic [47]. Table 4.1. presents list of occupational diseases and health loss consequences.

**Table 4.1.**

List of occupational diseases present in medical units and percentage evaluation of health loss consequences

| Occupational diseases list   | Kinds of work exposing to occupational disease   | Health loss percentage |
|--|--|------------------------|
| acute and chronic intoxications (and their consequences) with chemical substances                          | Any work exposing to toxic substances  | 0 – 100                |
| diseases caused by radiation. Also cancer, neoplasm, system and skin induced by this agents                | Any work exposing to radiation radioactive materials   | 20 – 100               |
| tendon and articulations diseases causing irreversible changes in locomotor system,                        | Work exposing to constant pressure and overloading skeletal system and articulations   | 5 – 44                 |
| Chronic and organic nervous and muscular system diseases caused by the manner of performing work           | Work requiring constants overload of groups of muscles, work in certain body posture or work causing pressure on nerve roots | 5 – 44                 |
| Infectious and parasitic diseases – hepatitis B and C, parasitic diseases transmitted by animals           | Work connected with contact with infectious materials, infected individuals or animals                                       | 0 – 100                |
| Chronic skin diseases caused by work conditions, changes caused by ionic radiation or infectious diseases. | Work connected with contact with irritable substances or with substances causing allergies                                   | 0 – 44                 |
| Legs varicose veins with tight ulcerations   | Work performed in upright position   | *                      |

Source: Self elaboration on the grounds [6]. Lack of data

Table 4.2. presents information about the number of workers employed in threatening work conditions in health and social work. Analysis of those data shows that the situation of workers employed in threatening work conditions got worse in examined period.

**Table 4.2.**

Workers employed in threatening work conditions in health and social work  
in Opole province between years 2000 – 2006

| Years | Total                     | Hazard connected with: |                      |
|-------|---------------------------|------------------------|----------------------|
|       |                           | Work environment       | Strenuous conditions |
|       | per 1000 persons employed |                        |                      |
| 2000  | 29                        | 29                     | 0                    |
| 2001  | 46                        | 30                     | 16                   |
| 2002  | 60                        | 54                     | 6                    |
| 2003  | 34                        | 30                     | 3                    |
| 2004  | 66                        | 62                     | 5                    |
| 2005  | 42                        | 40                     | 2                    |
| 2006  | 44                        | 21                     | 22                   |

Source: Self elaboration on the grounds of Opole province' statistical yearbooks.

Work strenuousness and specific conditions connected with performing it are risk factors for accidents at work. The most common factors characteristic for this occupational group are main causes of those accidents. Table 4.3. presents accidents at work and their consequences in period between year 2000 – 2007.

**Table 4.3.**

Persons injured in accidents at work in health and social work in Opole province  
between years 2000 – 2007

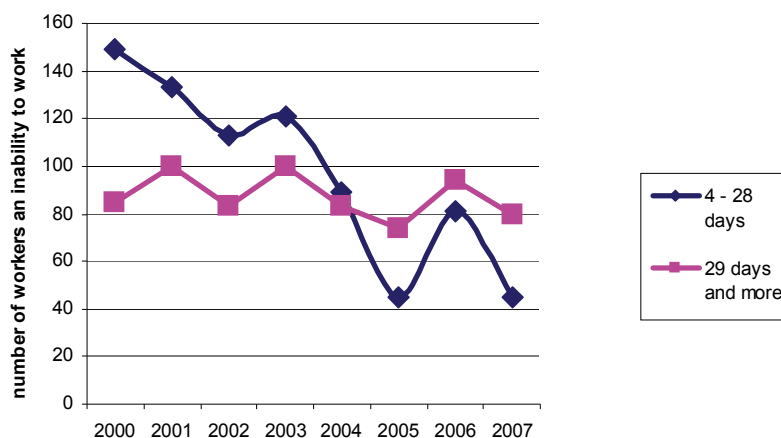
| Years | Grand total employees | Grand total persons injured in accidents at work | Serious accidents | The accident ratio* |
|-------|-----------------------|--|-------------------|---------------------|
| 2000  | 22027                 | 276  | -                 | 11,00               |
| 2001  | 19748                 | 264  | 1                 | 11,57               |
| 2002  | 18571                 | 235  | 3                 | 11,10               |
| 2003  | 14490                 | 251  | 1                 | 17,3                |
| 2004  | 13522                 | 221  | 1                 | 16,3                |
| 2005  | 13556                 | 137  | -                 | 10,1                |
| 2006  | 13668                 | 210  | -                 | 15,4                |
| 2007  | 13918                 | 149  | 1                 | 10,7                |

\* The accident ratio is the number of persons injured per 1000 persons employed.

Source: Self elaboration on the grounds of Opole province' statistical yearbooks.

The accident ratio (number of persons injured by 1000 employees) in health and social work in Opole province in years 2000 – 2007 prove that the rate was the highest in year 2003 (17,3 persons) and the lowest in year 2005 (10,1 persons).

Picture 4.1. shows consequences of accidents at work such as numbers of days when workers were unable to perform their work in medical services. We can notice the decreasing tendency in numbers of those days in comparison to year 2000. The highest decrease can be noticed in case of “off period” shorter than 28 days.



**Pic. 4.1.** Number of workers an inability to work resulting in accidents at work in health care and social services in years 2000 – 2007 in Opole province. Self elaboration on the grounds of GUS statistical yearbooks

Afterwards this chapter presents the results of questionnaire research from year 2001 conducted among 15% of nursery personnel of specialist hospital in Silesia region [47]. Research was conducted within the three units – urology, surgery and cardiology. Respondents were suppose to evaluate risk factors connected with their work that can be a cause of accidents at work, harmful factors present at their work stands and physical and psychological strenuousness of their work. Skin contact with chemical substances, swallowing or inhaling chemical substances were qualified as “often” present potentially health threatening factors. The most often causes of accident treats were situations connected with skidding and falls, body damage caused by sharp objects and other possible mechanical damages.

High temperature (getting burned while tools sterilization process), electrocution or “exposure to laser radiation” have been estimated as less threatening than mentioned above. Transporting patients between beds, lifting patients or putting them on wheelchairs turned out to be significantly difficult. The biggest problem was lifting and moving of heavy equipment and contact with repulsive factors (appearance, smell). Many respondents point at psychologically overwhelming situations such as “patients’ aggression”, staying in alert during night shifts and stress connected with responsibility for health and life of patients as very difficult.

Presented characteristics of work conditions have been supplemented by documents analysis from this hospital; period of years 1997 – 2000 [47]. Important fact is that during this period there was no fatal and only one serious accident. In reference to this, in this period the number of days resulting in inability to work caused by accidents decreased from 1003 in year 1997 to 70 in year 2000. The accident rate has been five times lower as well as their heaviness that was twice as low. I should add that in given hospital there was only one occupational disease reported which can be a proof of good prophylaxis in this area.

Results of the newest research conducted in year 2009 on cardiologic unit in selected hospital of Opole province are presented below [65]. Research subject was a subjective evaluation of biological, chemical and psycho – physical factors present in work environment. Moreover, evaluation of personnel behaviors in stressful and difficult situations as well as their awareness of accident threats has been examined. In first part of the research an evaluation of performed tasks and harmful factors that the personnel is exposed to have been conducted. Exposure to biological and physical factors connected with stress caused by responsibility for patients and constant readiness are the most overwhelming elements present in their everyday work. Stressful factors evaluated as “very meaningful” and “meaningful” for their health according to middle medical personnel are “resuscitation” and “patients’ aggression”.

On the grounds of obtained results we can say that workers are fully aware of threats connected with possibility of getting infected with such diseases as B and C hepatitis and HIV at given unit. The major threats are “getting pricked”, “injury caused by surgical tool” and “contact with biological material”. Table 4.4. presents hierarchy of threats present at given unit based on personnel opinion.

Half of the respondents consider “giving injections”, “moving and lifting patients” and “transporting patients” as “very meaningful health threat”. Taking into consideration those results, a proper work conditions should be created – safe work stands adjusted to ergonomic rules and using safe tools that minimize physical effort and threat level resulting from taking care of the patients.

To the question “Are you thinking about your own safety while saving patients life and health?” most of respondents answered that sometimes they do not think about threats and their safety. Those results show unconditional devotion of most of personnel who put patients’ lives over their own life. On the grounds of results obtained in the given hospital unit we can say that personnel is fully aware of threats caused by biological, chemical and psycho – physical factors and do not minimize their meaning in their everyday work. However – they put patient’s life over their safety.

In this profession, like in many others, there are many situations that potentially can cause accidents. Nurse’s profession is very characteristic though; because of constant contact with biological materials (sometimes infected) a minor cut can bring serious health consequences. Another health threat for medical personnel is physical overload which is proven in obtained results. Conse-

quences of excessive physical overload can be spine pain, legs pain, muscle pain, arm pain, chronic fatigue and varicose veins.

**Table 4.4.**

Threatening factors present during shifts in medical personnel opinion

| Threatening factors                 |   | [%]  |
|-------------------------------------|---|------|
| Very meaningful threat (4-5 points) |   |      |
| 1.                                  | stress caused by responsibility for patient | 59,5 |
| 2.                                  | inhaling and contact with disinfectants     | 59,5 |
| 3.                                  | staying alerted                             | 54,8 |
| 4.                                  | inhaling chemical substances                | 42,8 |
| 5.                                  | latex allergy                               | 42,8 |
| 6.                                  | mechanical injuries                         | 40,5 |
| 7.                                  | contact with medications                    | 38,1 |
| 8.                                  | aggressive patients                         | 35,7 |
| 9.                                  | allergy to medications                      | 28,6 |
| 10.                                 | skin mycosis                                | 21,4 |
| Meaningful threat (2-3 points)      |   |      |
| 1.                                  | aggressive patients                         | 52,4 |
| 2.                                  | inhaling chemical substances                | 40,5 |
| 3.                                  | skin mycosis                                | 40,5 |
| 4.                                  | contact with medications (allergic rash)    | 38,1 |
| 5.                                  | staying alerted (night shift)               | 35,7 |
| 6.                                  | stress caused by responsibility for patient | 35,7 |
| 7.                                  | contact with medications                    | 33,3 |
| 8.                                  | latex allergy (latex gloves)                | 33,3 |
| 9.                                  | mechanical injuries                         | 33,3 |
| 10.                                 | inhaling and contact with disinfectants     | 28,6 |

Source: Self calculation on the grounds of questionnaire research [65].

## 4.2. Consequences of work safety threats in teachers' profession

A difficult economic situation in Poland in previous political system influenced the whole social policy, especially significantly influenced education system and teachers salaries. That was one of the reasons why so many teachers quit their work not only because of health reasons (pensions for disabled) but also using a possibility of going to early retirement.

It is commonly known that teachers work is connected with possibility of mental changes, nervous system overload and voice apparatus problems. Moreover, their work takes place in specific material environment [55].

Accident threats, work strenuousness and difficulties are the result of technical condition of school building or equipment. Workshops where specific subjects are taught such as physics or technical education have to be safe, electricity in this area has to be properly secured. Equipment and tools cannot be damaged. Especially dangerous are workshops with access to gas or burners. Condition of sport equipment has to be good. Stairs railings should make it unable to climb or slide down. Fire control and its technical condition is crucial for students health and life as well as for the school building integrity. Research conducted in selected secondary school in 2005 and its results will present a work conditions awareness level of teachers working in this school [55]. The most numerous group of teachers working in this school had work seniority longer than 11 years.

The smallest group was represented by teachers working 6 – 10 years. To analyze work conditions safety not only inside of school was taken into account. Also outside of the school and surroundings are significant when it comes to situations that can potentially cause accidents. Thus, the teachers were also asked to evaluate school surroundings, especially communication routes and road surface quality. Results show that condition of roads, entrances and playground was not always evaluated as positive. Undoubtedly, proper condition of school surroundings decreases the number of accidents at school especially minor ones resulting in legs injuries; teachers with longer work seniority are aware of this fact.

Chemical laboratory at school is a very dangerous place; it is filled with harmful factors; thus other than chemistry teachers' knowledge concerning safety in this place is a very interesting issue.

In every group of teachers most of respondents claim that rooms where students are not allowed are properly secured against their access. Over 60% of respondents state that dangerous substances and compounds are secured and stored. Most of respondents believe that those chemical substances are also properly labeled.

Research confirmed that teachers belong to the group of workers who are fully aware of the importance of their profession; they also know well work conditions, both advantages and disadvantages. General conclusion is that teachers know the threats present at their work environment. Being aware of the threats makes them behave according to work and safety rules. Their behavior and attitude influence on students who, in future will continue this attitude in their own lives.

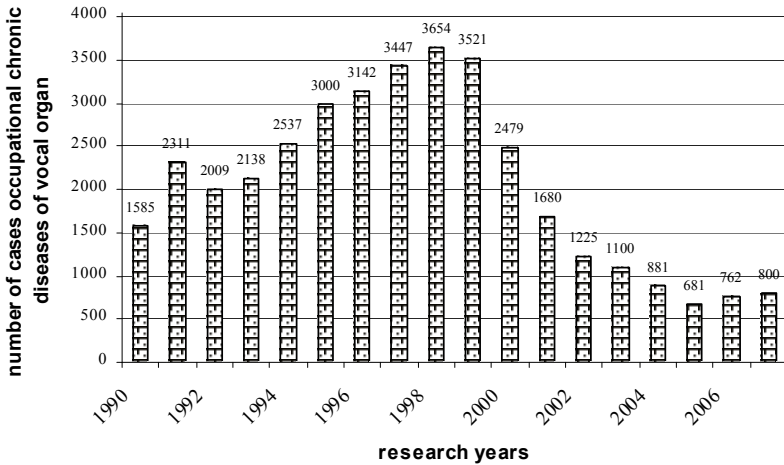
People who decide to become teachers should be aware that their voice will be their main tool to perform this work and that they expose it to serious overload. That is the reason why besides psychological properties, candidates should be aware of their voice importance and possibilities, only then they will be able to cope with this requiring profession [51].

Teachers' profession is one of the most difficult ones, not only because of responsibility of bringing up next generations; they also have to improve their

education. Moreover, mentioned psychological overload is significant and always present in this profession.

One of the factors that influence on workers health conditions is time they perform their work [24]. General opinion about teachers is that they do not work too much. However, research conducted in year 2005 in over elementary schools in Opole shows that only 8,1% of teachers work standard 18 hours a week. Most of teachers work 19 – 25 hours a week and 23% work more than 25 hours a week. We also have to consider that teachers spend many hours preparing to classes, preparing and grading tests and on other additional activities that belong to teachers' duties.

Generally accepted model of how school should function provides the teachers with right to rest during breaks between classes. This is not enough to regenerate. Chronic diseases of vocal organ related to excessive vocal effort are from year 1996 on the top of the list of occupational diseases in Poland, they constitute around 25% of all cases, picture 4.2. presents this hierarchy.



**Pic. 4.2.** Number of cases occupational chronic diseases of vocal organ in Poland in years 1990 – 2007. Self elaboration on the grounds of GUS statistic yearbooks

Data presented on picture 4.2. show that the end of the 90's of XX century was largest by the number of new cases of occupational diseases. In year 1998, 3654 new cases have been reported and starting with year 2004 the number decreased up to below 1000 cases. A group of occupational diseases described as chronic diseases of vocal organ related to excessive voice effort" which is present in teachers work include such diseases as node singing, paresis crease of vocal cord and vocal cord overgrowth [51]. The sudden increase of the number of these diseases is a paradox; most probably some teachers use the opportunity to apply for pensions before proper retirement age. This situation is caused rather by this than by real increase of threats present in teachers' profession.



Many teachers leave their job because they cannot cope with stress; moreover their work was not appreciated financially. Following research results can be presented as an example of this situation. The research has been conducted in year 2004 in selected secondary school situated in town (over 100.000 citizens) among teachers with work seniority longer than 10 years [52]. Main goal of the research was to check if stress is present in teachers work and what are its consequences. Teachers were asked a following question “Do you (after a few years of working at school) feel increasing emotions such as fear, anger, hostility, irritation, fatigue and mental overload?”. 52,9% of respondents answered “yes” to this question. Although they should be aware of these stress reactions, they did not see the link between stress symptoms and serious health problems. Teachers reported following symptoms: “sweating, getting pale, reddening, increased heartbeat, fast breathing, diarrhea (nervous background) (12%); 1/3 of respondents reports only “increased heart beat, palpitation, stiffening of muscles”. Only some of teachers (30%) realize that ‘physical deterioration and low immune deficiency are the consequences of long term stress exposure [52].

Although teachers in general do not understand that the stress is the cause of this situation, they claim that they try to fight consequences of pressure and difficulties connected with their profession. They were medically treated or are medically treating against:

- cardio – vascular diseases (35%),
- digestive system diseases (18%),
- muscular and skeletal ailments (pains) (12%) [52].

Research results, although their questionnaire character, confirmed that society do not pay an attention to psychological threats connected with performed work and by minimizing disease symptoms – cannot fight the stress.

Harmful factors present in school work environment and especially constant stress can lead to occupational burnout [56].

The research conducted among teachers (from elementary schools to universities), which goal was to identify factors responsible for occupational burnout can be presented as an example. Maslach Burnout Inventory (C. Maslach) and Subjective Work Evaluation (B. Dudek) were used as tools to connect the most strenuous factors in teachers work with occupational burnout elements [7;86]. Correlation coefficients prove the significant link between stress and its elements with occupational burnout. The strongest correlation with occupational burnout have such stress elements as: “lack of rewards”, “psychical overload”, “social contacts”, “sense of responsibility”.

We can conclude that, the higher “lack of rewards”, “psychical overload”, the more overwhelming “sense of responsibility” and the lower “social contacts” are – the higher level of occupational burnout teacher experience. The weakest correlation was discovered with “physical strenuousness” factor. „Stress at work” and its factors correlate significantly with “depersonalization” and “emotional exhaustion”. Correlation of factor “sense of personal accomplishment” with stress turned out to be not high but meaningful. Other correlations of “sense

of personal accomplishments” stressful factors at work turned out to be statistically irrelevant. Connection between “depersonalization” with “lack of control”, “lack of rewards”, “sense of responsibility” and “sense of threat” have been reported. The strongest connection is between “emotional exhaustion” and stressful factors at work. There is a high correlation between “emotional exhaustion” and “psychical overload”, “lack of rewards”, “social contacts”, “sense of insecurity”, “sense of responsibility”. Weaker relations is present between “emotional exhaustion” with “sense of threat”, “lack of support”, “lack of control”, “physical strenuousness”. The strongest correlation between “stress” and occupational burnout elements turns out to be with “emotional exhaustion”.

On the grounds of those results we can conclude that teachers work include many stressful factors leading to possible occupational burnout. Identifying those factors and defining their intensity can improve teachers work conditions in a practical way. It can also help to avoid mistakes in planning work tasks and duties for this profession.

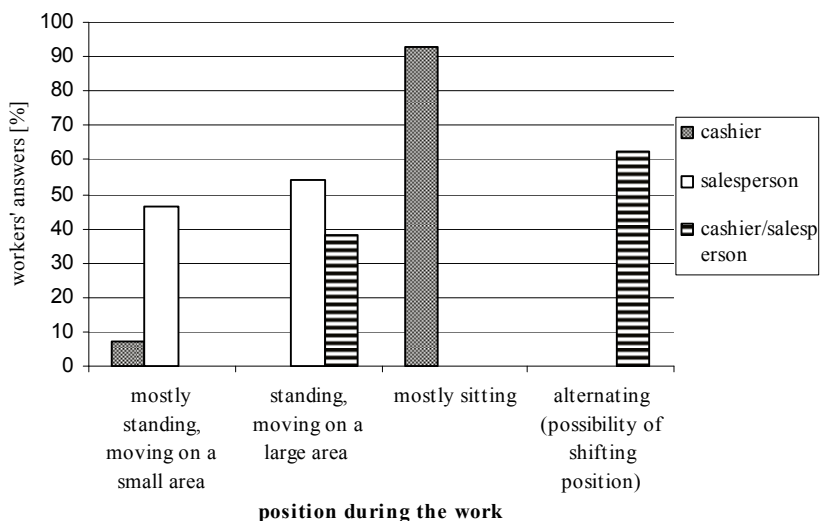
### **4.3. Work safety threats connected with trademen profession**

The example of health threats present in trade workers profession can be research results conducted in one of Opole commercial megastores in year 2007 [58]. Common knowledge concerning work in mega stores is far from the truth. These workers very often work in harmful conditions, which although do not excess norms – have a negative influence on human organism. In this profession the crucial problem is work strenuousness such as excessive physical overload, improper posture during performing work and working in constrained position. Obtained results enabled the evaluation of workplace ergonomics performed by cashiers, salespersons and cashier – salespersons. Due to technical reasons the researches have been limited to analysis of selected elements of human – work environment system (workplace). Especially significant meaning have those work environment elements that could be estimated in objective way and in agreement with workers sense of comfort.

Most of respondents were females, only 14% of respondents were males. 40% of respondents represented salesperson profession, 37% cashiers and others were employed at both positions.

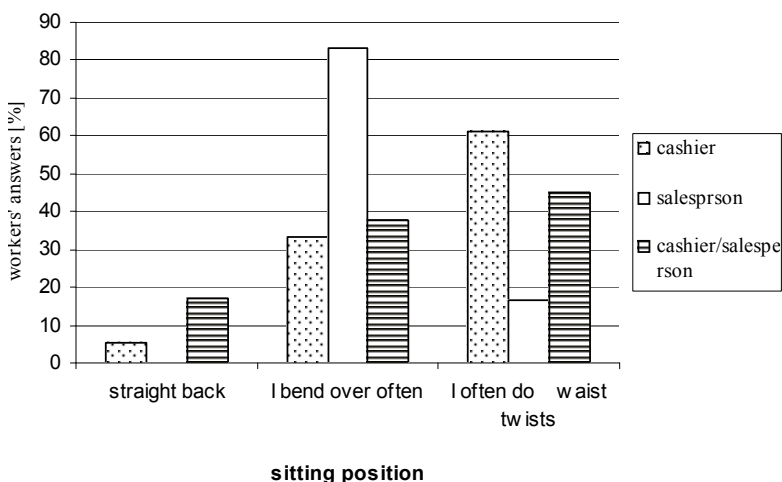
Picture 4.3. presents information concerning posture that workers have during performing their work [60]. Over the half of salespersons responded, that they perform their duties in forced body position, mostly standing and moving around a large area of the shop. Other workers during work remain standing or are moving on the small area. Cashiers perform work in sitting position (92%).

Work comfort depends to great extent on the space of workplace and freedom of movement. Research showed that 64% of cashiers declare not enough space. It may be result of the fact, that it is mostly occupied by two employees sitting back to back.



**Pic. 4.3.** Workers answers concerning posture during the work

Performance of duties at workplaces involves directly the necessity to shift body positions – results can be found on picture 4.4. [58].



**Pic. 4.4.** Workers answers concerning posture during the sitting work

Over 80% of salespersons declare that during work they have to reach for objects located in some distance. Taking a bent body position during work was declared by 33% of cashiers and 37% of salesperson-cashiers of workers employed in this given mega store in Opole. In case of persons working at the cash register the bent body position may be a result of improper height of merch-

dise feeder. It may be concluded that seat regulation with regard to the feeder is improper due to various factors.

Another issue is the transport of merchandise and its location in proper parts of a store. It needs to be stressed, that merchandise is delivered to large commercial facilities in packages of different sizes and weight. One of the ways of internal transportation, especially in this type of facilities, is manual transport works based on individual carrying of packages. 70% of all surveyed declare performing it this way, and all of employees declare, that they passed relevant training.

It is necessary to stress, that employees working as cashier-salesperson perform activities involving pushing or pulling of a wheel cart more often than others.

Excessive physical strain of organism often involves severe impact on health if it is not balanced by periods of relaxation allowing employees to recover.

Responses of employees working at different workplaces, because performing work both in standing or sitting position by cashier and in standing position by salesperson bears a risk of many ailments of human locomotor system. These ailments in primary stadium appear as short-term inability to work, but with time they may lead to severe dysfunctions of human motoric system.

Next part of the survey concerned subjective evaluation of selected physical factors. This research focused on such factors as: noise, microclimate and lighting, because they influence work comfort and thus employee's effectiveness.

It appears that most of the cashiers point out that cash register equipped with barcode reader helps at work on the one hand, but is a source of serious noise on the other.

Sales personnel does the same with shelves, refrigerators (45%) and slicers (43%). Majority of the surveyed is of the opinion that noise intensity at the workplace changes during workday and depends on several factors, mostly on traffic intensity within the shop. Changes in noise intensity were pointed out by 80% of cashiers and salespersons, and 70% of cashier-salespersons.

Other harmful factor is workplace microclimate. The question concerned thermal comfort – the only subjective way of effective temperature sensing. Evaluation of this workplace aspect by persons working on different workplaces in this particular commercial facility was most interesting. Vast majority (70%) of the surveyed employees performing duties of cashier and salesperson declare thermal comfort.

Evaluation of thermal comfort in given mega store have been conducted by employees in relation to their workplace, and therefore to body position during work.

Evaluation of lightening quality at their work stands turned out to be positive.

The survey confirmed the fact, that workers are not aware of negative influence on health of improper body position maintained for many hours of work.

An evaluation of selected harmful factors such as noise, microclimate and lighting allows claiming, that employees see the discomfort of their occurrence, but they do not see their connection with various health problems.

Surveyed employees point out at noise as an unpleasant and stressful. They are aware that it hinders concentration and thus performing of their duties themselves. Furthermore it builds up fatigue.

#### **4.4. Work safety threats in firemen profession**

Fireman profession is performed by officers employed in National Fire Brigades. They perform typical and characteristic for their positions tasks. Firemen work in dangerous locations, participate in direct life saving actions in situations of life or health threats; they liquidate or delimit consequences of those situations [8].

Fireman save threatened people, animals, property and environment threatened by fires and other natural disasters, technical, chemical, ecological threats and participate in life saving medical actions. Describing and analyzing fire circumstances we can mention many threatening factors such as high temperature and heat stream density, smoke, toxic substances, insufficient oxygen level. The objects firemen work on can break, fall into smaller elements putting their life in danger. Accident in firemen work can be caused by any element of their material work environment separately or can be the result of presence of many of them. High temperature and heat emission are the most threatening factors.

Threatening factors causing accidents in this profession are:

- low oxygen concentration – possibility of suffocation,
- hot surfaces, air, gases – possibility of skin and respiratory system burns,
- glass, metal and other sharp objects – possibility of being cut or stabbed,
- falling construction elements (ceilings, walls), debris – possibility of being hit or crushed,
- immobile protruding construction elements, especially in limited visibility circumstances – possibility of being hit,
- communication accidents while emergency calls – various injuries,
- electrocution – possibility of getting shocked as a result of failing electrical devices,
- gas leaks – possibility of various burns and injuries as a result of fire or explosions,
- chemical substances during fires – possibility of intoxication,
- slippery and uneven surfaces, ladders, stairs, roofs – possibility of injuries as a result of slipping, tripping or fall.

Consequences of those risky factors can be serious or fatal. Firemen very often have to deal with different chemical substances that are toxic, caustic, burning or explosive. Chemical factors present in firemen work are:

- insufficient oxygen level, presence of carbon dioxide – possibility of anoxia and as a result – suffocation,
- various chemical compounds – severe intoxication, burns, skin inflammation,
- leaking gases coming out from damaged containers or technological installations in fire locations – intoxication risk,

– foam substances and other disinfecting materials – skin inflammations.

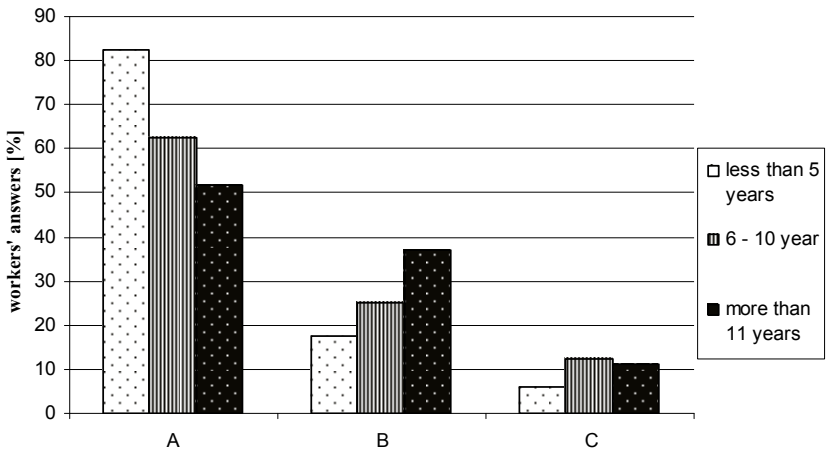
Moreover, fire brigades are often participating in such events as communication accidents, industrial accidents, earthquakes, floods or ecological disasters.

This cursory characteristic of firemen profession shows how crucial is their knowledge, qualifications, fitness and moral immunity. In their profession they have to face the whole spectrum of threats present in various work conditions, thus the occupational risk is difficult to evaluate.

Research results show that firemen have good professional background and knowledge and that they are well qualified [8]. Depending on work seniority they realize problems resulting from many hour shifts.

An attempt to evaluate work conditions in fire brigades shows how difficult this service is, how great the risk is and how much sacrifice this profession demands from officers.

The research concerned to firemen awareness and their opinion about adequate equipment such as protective clothing and their threats knowledge. The most important question was if they are aware of life and health threats during life saving actions.



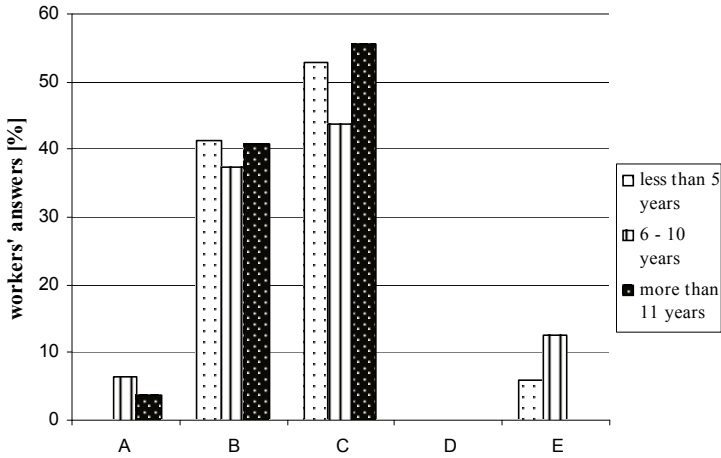
**Fig. 4.5.** Workers' answers concerning work safety importance. Indicators: A – it is very important for me; B – it is important for me, C – I don't really care, what matters is task I have to do

Picture 4.5. presents firemen answers concerning the importance of their safety depending on their work seniority.

Firemen do care about work safety which is proven by research results. We can notice that firemen become more aware of work safety importance and potential threats with increasing work seniority period.

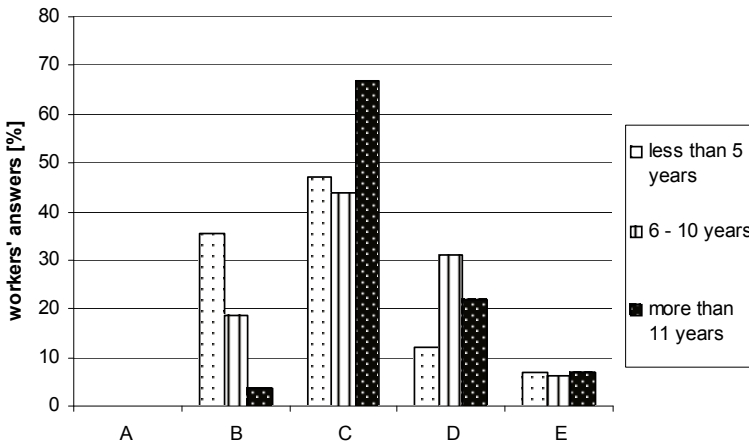
Risk they take in life saving actions depends on trust they have for their co-workers and equipment they use. Evaluation of technical equipment will be presented on following pictures.

Firemen generally evaluate their technical equipment as good, only some of them (pic.4.6.) describe it as perfect though. Most of the answers describe it as “very good” and “good”.



**Pic. 4.6.** Workers' answers concerning their preparation for fire actions and equipment they use. Indicators: A – perfect; B – very good; C – good; D – bad; E – I don't have an opinion

Most of answers concerning the evaluation of equipment used in chemical threat situations describe it as ‘good’. None of work seniority groups described it as “perfect” (answer A) (pic. 4.7.). We can conclude that firemen have very realistic attitude towards their unit's technical equipment, its condition and quality.



**Pic. 4.7.** Workers answers concerning their preparation for actions connected with chemical threats and equipment they use. Indicators: A – perfect; B – very good; C – good; D – bad; E – I don't have an opinion

Research also proves that the longer they work, the more visible and important is for them the meaning of good team work, proper behaviors and safety; these together make them feel secure and not afraid. In firemen profession it is crucial to be aware of existing threats and to react to them in a proper way. Their work is undoubtedly specific because it is connected with extraordinary dangerous and mental and physical overload present during day and night shifts.

## **Recapitulation**

Chapter presents four different professions performed in extremely various conditions. Paradoxically, medical services workers are the highest risk profession. Research concerning work conditions and threat awareness show that both, in medical services and fire brigades workers are fully aware of possibility of life and health threat. Both professions save human lives, work in very difficult conditions, use specialist equipment and bear responsibility for others. Making fast decisions and taking immediate actions also links those two professions. Stress they experience stimulates on one hand but is also a serious threat to their health on the other. Moreover, both professions use specialist protective clothing; its damage can lead doctor, nurse or firemen to tragic consequences. From this perspective, work conditions other professions workers have seem to be very comfortable.

Teachers work environment have been earlier presented from the noise threat point of view. This chapter also explains the influence of psychological overload that can lead to the whole spectrum of other diseases such as vocal cords damages, burnout or even heart attack. Stress exposes teachers to nervous, digestive system diseases and mainly to circulatory system diseases. Its influence on their work and life can be the cause of burnout.

Also employees working in mega stores; salesmen and cashiers are threatened by work conditions although their profession does not expose them to any high risk. They are aware of those threats. Their work is often performed in unsuitable conditions such as insufficient lightening, cold micro climate and excessive noise especially in case of cashiers. Many of them have to move products, they perform their work in constrained position or can't change their posture for many hours.

Research proves that those differentiated work conditions for various professions have one thing in common – presence of health threats. In firemen and nurses case – their life can be put in risk, in others – because of constant exposure to threatening conditions within following years they might lose ability to perform their work.



## Chapter 5

# INDUSTRY WORKERS' SUBJECTIVE EVALUATION OF WORK SAFETY AND CONDITIONS IN OPOLE PROVINCE

A subjective evaluation made by employees working at various work stands can help to present work conditions from the point of view of their experience, qualifications and position within the company. Workers' evaluation of work conditions can differ from those evaluated on the grounds of harmful factors measurements.

### 5.1. Work safety and work social environment

Modern human resources management means improving workers' awareness concerning work safety, effective motivating, suitable trainings and adequate evaluating of work effectiveness. Company's financial situation is crucial for creating proper social work conditions; it also influences material work environment, social infrastructure and providing workers with necessary existence needs.

A company, works or organization not only produces goods; it is also supposed to satisfy workers social needs. Its goal is to enhance workers bond with a company as well as improving good atmosphere within the company. It relates to all aspects of social work conditions; not only to worker – employer bond but also bonds between workers. However, creating and promoting rules of safe behaviors should be a priority.

According to professional literature a social work conditions are social function of a company including any beyond production actions towards the workers and company's surroundings [13]. Company's social function which constitutes national social policy's element is supposed to improve workers' life conditions. It is an important element of integration and stabilization of the crew that motivates them to effective work [59]. In wide meaning it should provide health and work protection, work safety control and pro – social activities. To provide proper social conditions within the company, workers and their families should have access to leisure activities, sport halls and obtain additional welfare or benefits.

Wide activity within social work conditions that is realized by the employer according to personnel management theory can sometimes bring negative con-

sequences. This might be result of improper communication between different levels of company's hierarchy, result of poor managing or bad atmosphere at work<sup>21</sup>. Not only employer and his relations with workers define quality of social work environment; it also depends on worker and his social environment [73].

This situation is more difficult in organizations that do not comply with workers' elementary expectations (wages, material work conditions) and satisfy their basic needs only on minimum level. In this case workers' participation in informal structures can meaningfully influence on workers behavior during work process. Those informal structures play a key role in forming social work conditions including safe behaviors in work process for workers involved with them [48].

Work social conditions in a sociological approach are first of all interpersonal relations and such factors as performed activity prestige, a conformability between performed work and workers' qualifications and social motives for performed occupation [48]. Both emotions and motivational tension, especially those with positive valuation, are treated as a source for effective activity. That is because motivation influences on either organism's activation level or speed of reaction and intellectual and psychomotor tasks performance efficiency. Widely understood – satisfying one's needs and a fact of being safe causes increase of man's efficiency as a "social animal". An opportunity to feel satisfaction because of performed work is very important and is one of the factors assuring work safety reliability, especially in case of work performed in a harmful and strenuous for physical and psychological health condition.

An example can be research results that has been conducted in industrial works (various branches), especially in ones with heterogeneous organizational structure, different forms of property, and huge dispersion for number of employees (2002) [48].

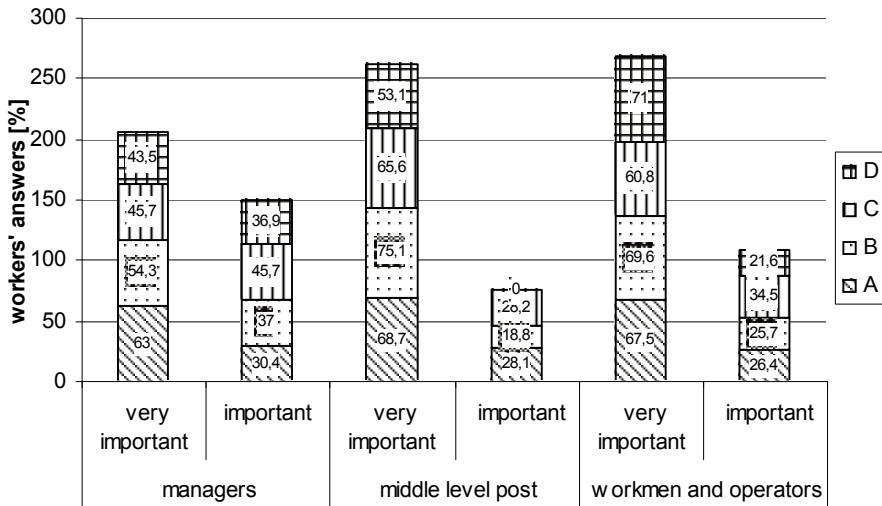
In group of answers on question, referring to influence of conditions at the work stands on product quality, a huge differences can be noticed, especially in evaluation of influence importance for following factors: „worker friendly work conditions”, „correct interpersonal relations”, „an optimal work environment conditions” and „norm conformable state of social base”.

Picture 5.1 presents workers' answers depending on their position in company's hierarchy taking into consideration the most important for them social work conditions' elements [48]. Workers were divided into three groups: First group were managing positions or specialists, second was middle level personnel (engineer, organization and production development specialist, marketing and trade specialist), a technician (or a different kind of medium level technical

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<sup>21</sup> A social communication is a process of creating, transferring, and distributing information between individuals (interpersonal communication), between groups and social organizations. The aim of the communication is creating, modifying, changing attitudes and behaviors conformable to sender's and receiver's businesses and values.

staff), the third group were ground level workers such as an industry workers, operators, device fitters and unqualified workers.



**Fig. 5.1.** Workers' answers concerning influence of work social conditions on work quality. Indicators: A – Worker friendly work conditions, B – Correct interpersonal relations, C – An optimal work environment conditions, D – Norm conformable state of social base

„Medium level workers' scored „worker friendly work conditions”, „correct interpersonal relations” and „an optimal work environment conditions” as the most important and crucial for production quality. In a general view we can notice that the importance of work conditions matter more for the industry workers, unqualified workers, fitters and operators and not so much for managing staff and specialists. Analysing that part of the questionnaire we can risk a sentence that respondents' groups have answered according to their own business. It is possible that supervising staff does not realize a dependence between work effectiveness and work conditions.

Worker friendly social work conditions decrease or liquidate the influence of stressful factors. One of the most important social work conditions is proper interpersonal communication within the workers that increases work effectiveness and decreases number of stressful situations [48].

To prove the importance of social work conditions, a research results will be presented. The questionnaire research was conducted in large production unit in Opole province (2003). The subjects of interest were:

- Employer's relation towards worker, his interest with worker's life and atmosphere in work place.
- A possibility of being given help and support in situations difficult for a worker, resulting from the lack of suitable worker's qualifications or difficult personal situations.

- Interpersonal bonds between employer and employee and between co-workers.
- Emotional bonds between worker and his works [49].

Employees working directly at production process (qualified and unqualified workers, device fitters and operators) have been subjected to research [49]. In the beginning workers from different groups were evaluating employer's interest with workers health condition, their financial situation and atmosphere within the company. In this case an unqualified workers gave them the best opinions; 46% of them think the employers care about workers' health, 55% claim they care about atmosphere at work and 36,4% state that employers care about workers financial situation.

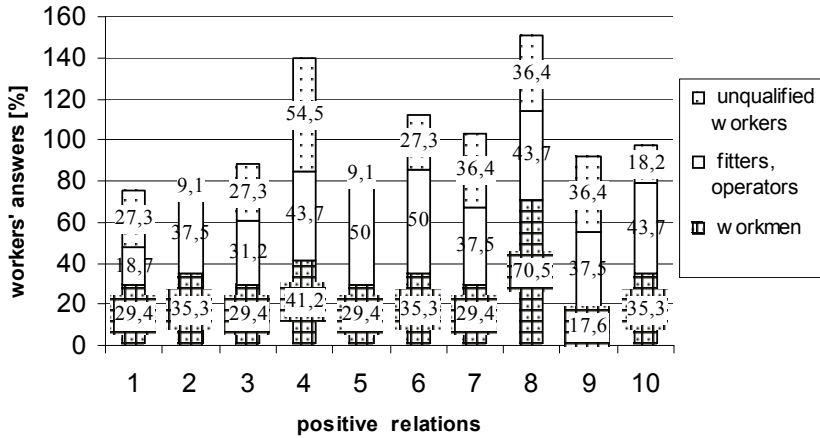
Afterwards, workers were evaluating their attitude towards other workers belonging to so called 'special groups' such as recently employed workers, young workers, pregnant workers and workers just before getting retired. Workers state they have especially positive attitude towards recently employed workers and those who are just before getting retired (in this group the most friendly attitude is presented by device fitters and operators). Unqualified workers show there negative attitude towards all "special groups" except workers just before getting retired. A distant consequence of unfriendly atmosphere at work especially for some groups (youth, pregnant women, workers just before being retired) can bring not only decrease of work efficiency but also stress and risky behaviors. We can conclude that evaluation of attitude and behaviors towards "special groups" shows serious social problems and does not prognosis well for future.

Problems resulting from unadjusted qualifications (education) towards tasks and activities performed in work process, are the often declared by device fitters and operators. Crisis situations cause such emotions like anxiety, anger and discouragement. In this situation, a question asking who could help a worker in such situation has become crucial and important.

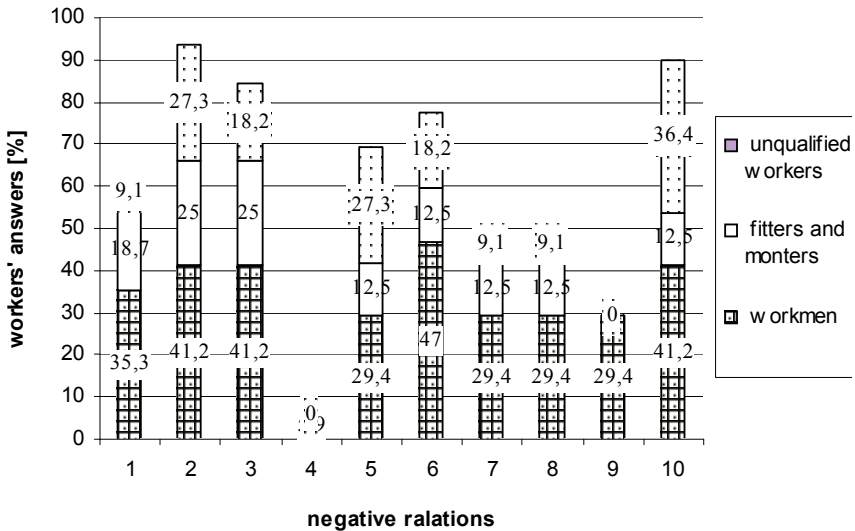
Obtained answers show that workers generally can count only on other workers help. The group of device fitters and operators is the only one who declares that can count on employers' help.

Unqualified workers highly appreciate help in personal problems and they are convinced that they get it from both co workers and employers. On the grounds of obtained results we can say that relations between employees working on equal rank positions are correct. Most of respondents claim that others' attitude towards them is also positive. Research defines positive attitude as "giving advices, providing help, are friendly, respectful, honest etc".

Picture 5.2. presents results concerning workers' (qualified and unqualified workers, device fitters and operators) evaluation of positive characteristics relations present at their work place [49]. Generally most of the relations is estimated as positive (where a maximal number of such answers is 150%), where first place is taken by answers "employers have positive attitude" and "employers do not cross borders of personal dignity".



**Pic. 5.2.** Workers' answers concerning a positive attitude of superiors and technical supervision workers towards workmen. Indicators of relations described as positive: 1. Employers concern worker with respect, 2. Employers concern worker with forbearance, 3. Employers concern worker with patience, 4. Employers have positive attitude, 5. Employers is ready to help and to give advice, 6. Employers try to adjust work tasks o worker's possibilities, 7. Employers behave friendly, 8. Employers do not cross borders of personal dignity, 9. Employers appreciate work and are able to reward, 10. They address worker in well – mannered way



**Pic. 5.3.** Workers' answers concerning negative attitude of superiors and technical supervision workers towards workmen. Indicators of relations described as negative: 1. With no respect, 2. Without forbearance, 3. Without patience, 4. With negative attitude, 5. Criticize all the time, 6. Order tasks exceeding worker's possibilities and qualifications, 7. React with ill-will and hostility, 8. Hold worker with contempt, 9. Estimate negatively, 10. Use indecent words

Picture 5.3. presents results concerning evaluation of negative relations with superiors and medium technical personnel [49]. Among relations evaluated as negative (where a maximal number of answers is over 90%), first place is taken by answer “they show no understanding” and “they curse”.

**Table 5.1.**

Evaluation of company’s social functions and emotional bond with a company

| Groups of examined employees | Emotional relation with the works |             | Estimation of the works’ social functions |                              |                            |   |                               |       |
|------------------------------|-----------------------------------|-------------|---|------------------------------|----------------------------|---|-------------------------------|-------|
|                              | yes                               | hard to say | assures health protection                 | assures irreclaimable grants | takes care of stately life | appreciates workers with long training period | takes care of retired workers | other |
|                              | [%]                               |             |   |                              |                            |   |                               |       |
| A                            | 23,5                              | 23,5        | 41,2                                      | 11,8                         | 5,9                        | 17,6  | 17,6                          | 0     |
| B                            | 37,5                              | 12,5        | 25,0                                      | 12,5                         | 6,2                        | 18,7  | 6,2                           | 0     |
| C                            | 36,4                              | 27,3        | 18,2                                      | 9,1                          | 0                          | 63,6  | 27,3                          | 9,1   |

Indicators: A – Workmen; B – Device fitters, device operators; C – Unqualified workers.

Table 5.1. presents workers’ answers concerning company’s social functions and evaluation of their bond with the company [49]. Less than half of workers from all the groups claim they feel emotionally connected with the company, which can be a result of their work seniority.

Social functions of works are well estimated by unqualified workers group, which are related to works because of the lack of education and proper qualifications that could allow them to become a part on job market.

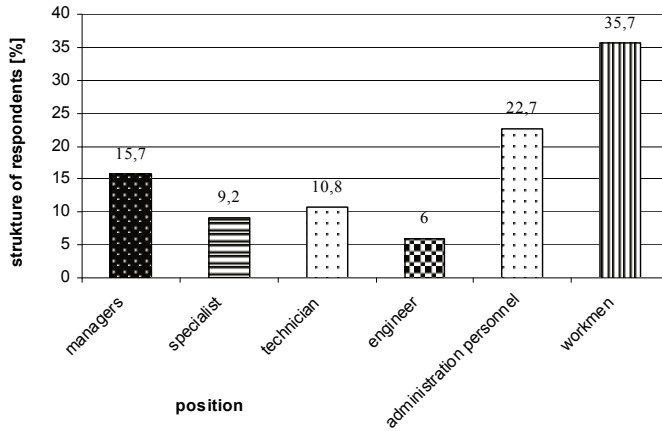
We can risk the statement that relations between superiors and workers and between employees working on the parallel work stands are correct, which results from the obtained data. That can be a base to create strong interpersonal bonds and to create favorable social work conditions. We can say that correct relations between employees working on parallel work stands, correct relations with superiors and employer’s care of the workers, create a situation that influences the whole of work conditions, its safe performance and results.

Research conducted among production workers extended the knowledge concerning social and material work conditions [59]. Questionnaire referred to social and material work environment, research was conducted among population employed in production units of Opole province (2006 – 2007).

A detailed structure of workers participating in research is presented on picture 5.4.

First part of a research focused on social work environment, following aspects were investigated: work as a value, workers’ motivation to better work

performance, possibilities to improve/get promoted and its importance for workers and interpersonal relations within the works.



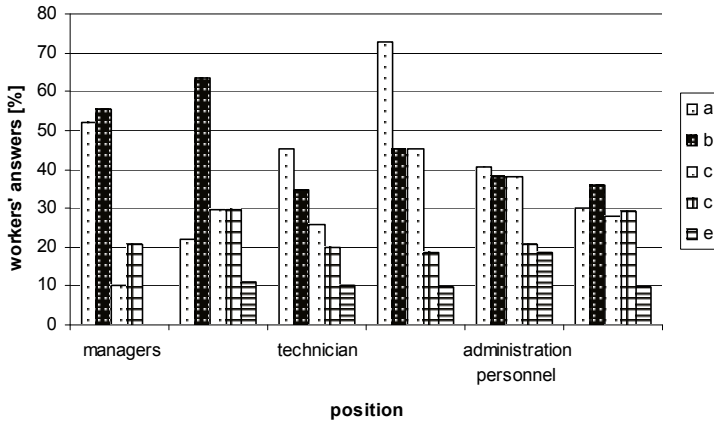
**Pic. 5.4.** Structure of respondents according to their work position within the works

Among workers on managing positions and specialist most of them stated that the most important is “awareness of responsibility for performed work” (for 55%), “salary enables to provide for family” and “I am appreciated by company management” (each 41%). For technicians the most important is awareness of “responsibility for performed work” (55%), “I have an influence of “creating” process”, “my engagement counts” and “I am provided with medical care” (each 30%). Among administrative workers “awareness of responsibility for performed work” dominates (43%). Engineers consider financial motivation “salary enables to provide for family” as the most important, lower in ranking is “work is very interesting” (55%). Also “I have an influence of “creating” process”, “my engagement counts” and “I am appreciated by company management and co-workers” achieved high scores in engineers’ opinion (46% each). Workers state that “I am appreciated by my co-workers” is the most important (38%). Other motivations were evaluated on various levels. What is interesting; workers who very often work in difficult conditions do not seem to care about being provided with medical service, extra benefits and proper hygienic work environment. Also 30% of workers do not think that material motivation is important for their engagement in work they perform.

Another question concerned “atmosphere at work”. It could be evaluated from 5 – 0 points, where 5 described very positive atmosphere and 0 definitely negative. This element of work conditions is very subjective and difficult to define. That is why additional questions about co-workers and respondents relations with co-workers were asked. Workers (qualified and unqualified) and administrative workers appreciated the most “good atmosphere at work”. Good atmosphere at work has the least meaning for engineers and management work-

ers. On the other hand – workers and administrative workers do appreciate good and friendly atmosphere.

Next question concerned other people from work environment (various positions) and how workers perceive them.



**Pic. 5.5.** Workers’ answers concerning other co-workers behavior in dependence on their position. Indicators: a – friendly, b – helpful, ready to give advice, c – they took care of You when you started work in this company, d – they helped in difficult moments, e – they never let me down

Picture 5.5. presents answers that show the group of engineers who did not really care about good atmosphere at work is actually surrounded by “friendly” (73%), “helpful”, ready to give advice’ and those who “took care of them when they started work in the company” (46%).

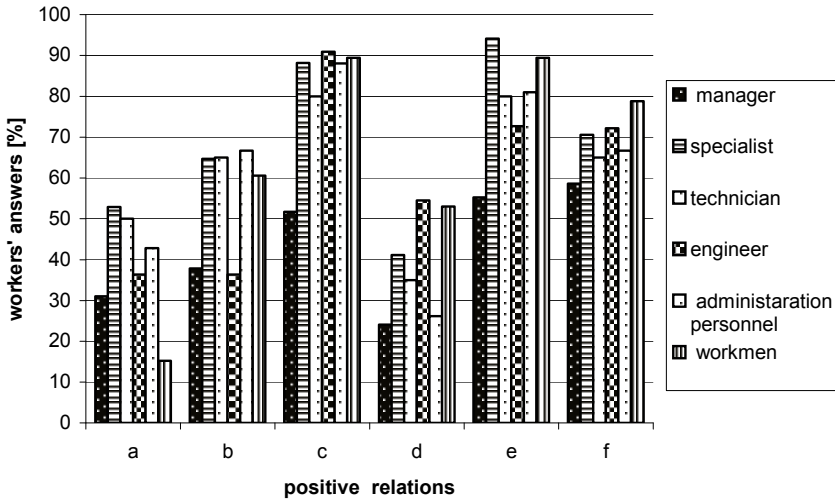
Physical workers and administrative workers have a constrained opinion about their social environment. Among extra questions they could add (answer f”other”) concerning their opinion about co-workers they put only few information such as “nice”, “they are just my colleagues”, “two faced”, “hard working”, “not too nice”, “indifferent”, “egoistic”. This is the reason why those answers were not included on picture 5.5.

Next questions concerned evaluation of co-workers behaviors within the company. Obtained results are presented as graphs because respondents were given closed answers to choose from (positive or negative attitude). However, declaration of negative attitude towards someone did not eliminate a chance to appreciate some positive behaviors perceived in others.

Co-workers’ positive attitude is very important for technicians, administrative workers and regular workers (pic. 5.6.).

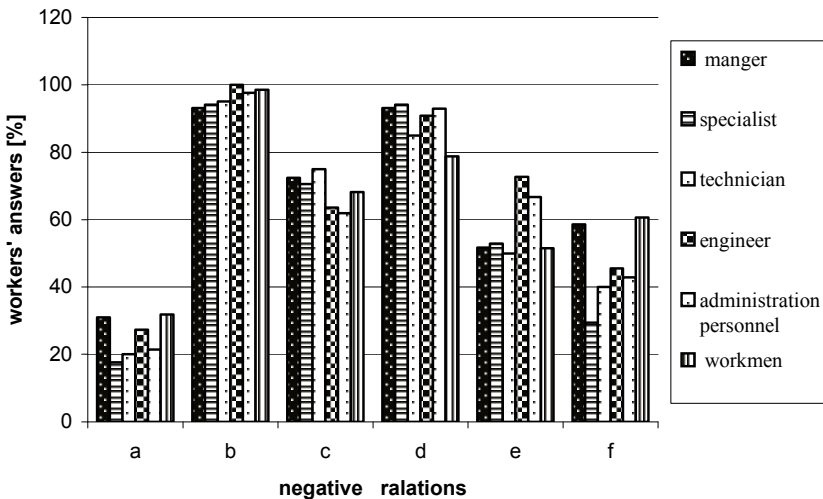
This confirms their previous statement about how meaningful atmosphere at work is. Moreover, management staff is aware of some positive attitude of other workers, their evaluation oscillates between 24% – 60%; the lowest score has “friendly help” and the highest position is taken by “solidarity in taking blame”.





**Fig. 5.6.** Workers' answers concerning others' positive attitude. Indicators: a – nice attitude, b – giving tactful remarks, c – truthfully, d – friendly help, e – solidarity in taking a blame, f – contributing to keep good atmosphere at work

Picture 5.7. present results concerning other workers' negative attitude. Especially specialists and engineers see clearly negative attitudes towards workers and co-workers. Those attitudes and behaviors have different forms such as gossiping and unfair actions. "Brutality" and "deception" were the most common among give answers by all examined groups (over 80%).



**Fig. 5.7.** Workers' answers concerning others' negative attitude. Indicators: a – ruddiness, b – brutality, c – falsehood, d – deception, e – blaming others, f – gossiping

Honest answers obtained from respondents from various positions show that situation is complicated and results concerning social work conditions cannot be evaluated unequivocally. In this numerous examined populations – percentage distribution of attitudes evaluation (positive and negative) was more – less equal.

Summing up these research results we can see that general opinion concerning evaluation of social work conditions was positive; it means they appreciate friendly atmosphere and understand its meaning for the company and themselves. Although workers from various hierarchy levels notice others' negative attitude, however they claim they are surrounded by friendly people who create good atmosphere at work. It is assumed that good social work conditions have an influence on safe and responsible workers' behaviors in work process.

## **5.2. Work safety and material work environment**

The beginning of XXI century (research results concerning this period are presented below) is the period of establishing Balcerowicz's economic plan; its negative reflection in social area were society stratification, pauperization, increase of unemployment and increase of number of homeless people. Undoubtedly, "lack of social safety" had an influence on workers behaviors in this period. Changes in polish economic system made people feel threatened; they started to worry about their existence and employment [27].

Thus, considering this background we should analyze companies, their functions and role in creating socially acceptable work conditions. Elementary functions of any branch company are: technical functions, economic functions, trade functions and personal functions such as human resources, trainings, scales of charges, salaries, work safety and hygiene and social problems. Mentioned functions have influence on company's work conditions – defined as the whole spectrum of material, economic and social elements of production unit that determine directly worker's situation in work process.

The serious problem in polish economic reality in the beginning of XXI century was obeying to labour law in newly created business entities<sup>22</sup>. Employer following of all work hygiene and safety regulations should guarantee proper and safe work conditions within the works [19]. It was especially problematic in this period. Difficult financial situation in most of new bossiness entities enabled following safety regulations, employers rather pretended to follow them than invested to provide the workers with proper work safety conditions.

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<sup>22</sup> Before the worker starts his job, he has to undergo work safety training and work stand training. Employer is obliged to inform the worker about threats present at his new work stand (occupational risk). Employer, according to labour law is obliged to provide the worker with safe work conditions, and if it is not possible he should secure him with proper individual protection means [85].

Very difficult situation could be noticed in small companies, where employer was the only legally responsible person for any possible work safety offences and their consequences.

Thus, constant analysis of work conditions (material as well as social) linked with workers' awareness concerning threats at work can be grounds for national social policy.

This subchapter presents the second part of questionnaire research conducted among industrial units of Opole province in years 2006–2007 [27]. Subjective evaluation of work conditions (including the influence of harmful factors on workers' health and wellness) and influence of work conditions and work process organization on work quality and efficiency.

Questions concerning kind of performed work, way of performing work and its influence referred first to description of work and then to identifying which of work elements has “insignificant”, “moderate” or “significant” influence on respondent's health. Closed questions were given answer options of work description “requiring concentration”, “high pace causing fatigue”, “strenuousness” and “overwhelming physical effort”.

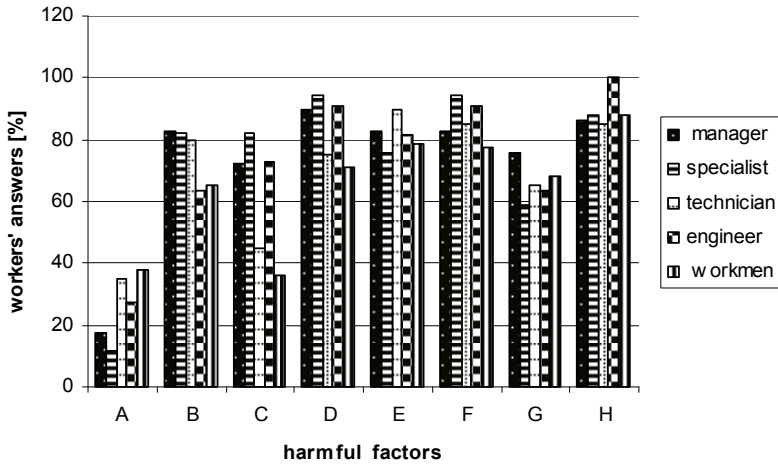
Only the group of management workers sees clearly the influence of “way of performing work” on their health. According to these respondents it concerns “nervous system overload” caused by way of performing work but also by “often necessity to go outside the building”. Other groups do not perceive it that clearly, their answers are rather moderate. However, answers in group of supervisors point at some factors that influence their health – “psychical overload”, “stress” and “responsibility”.

Administrative workers' position is characterized by “psychical overload”, “stress”, “work characteristics changes”, necessity to leave the building and “work monotony” and have rather moderate influence on their wellness.

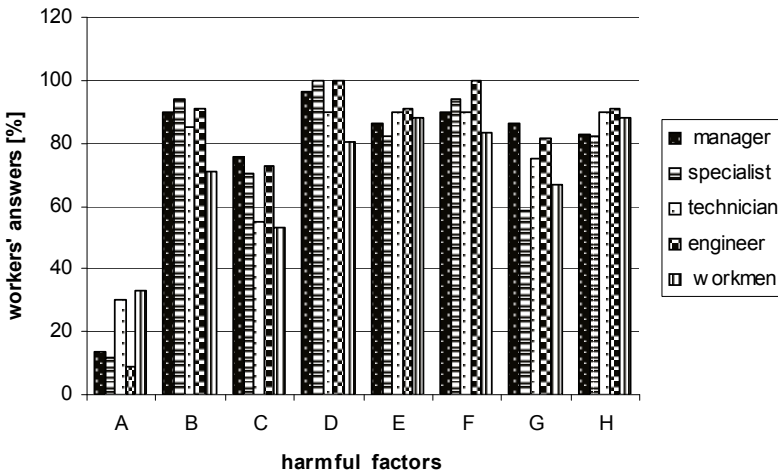
Regular workers' answers had different character; dominating factors they mentioned were: “psychical overload”, “stress”, and “work monotony”. Most of them were informed about threats at their work stands. Picture 5.8. presents workers' answers concerning harmful factors present at their work stands.

All the questionnaire results, coming from various production units among many workers from different positions in companies' hierarchy are similar. Management and specialist point at specific harmful factors, which regular workers are really threatened by and are not aware of.

Picture 5.9. presents results of evaluation made by workers concerning the influence of this factors on their health. In both cases, answers of administrative workers were omitted. Most of respondents agreed that harmful factors influence on their health. More and more often even management and specialists face production workers and among their answers we can find such harmful factors as „vibration”, „dust” and „microclimate”.

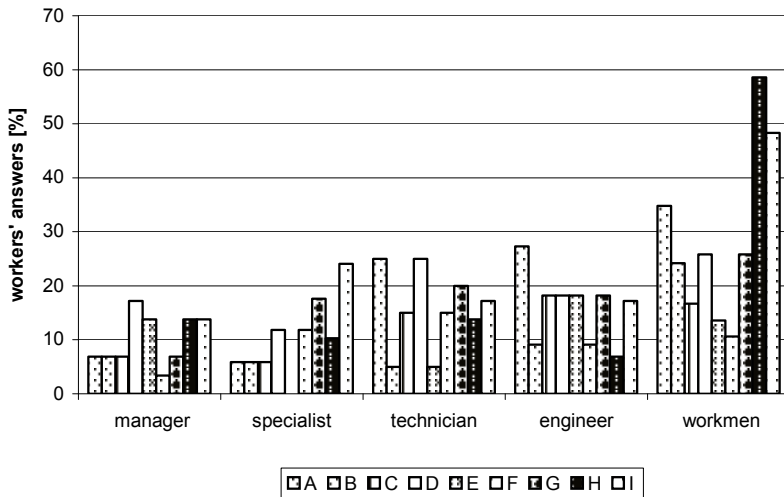


**Pic. 5.8.** Workers' answers concerning harmful factors present at their work stands. Indicators: A – chemical substances; B – dust; C – noise; D – vibration; E – hot microclimate; F – cold microclimate; G – insufficient lighting; H – other factors



**Pic. 5.9.** Workers' answers concerning the influence of harmful factors present at their work stands on their health or wellness. Indicators: A – chemical substances; B – dust; C – noise; D – vibration; E – hot microclimate; F – cold microclimate; G – insufficient lighting; H – other factors

Production workers claim that „vibration”, „dust” and „microclimate” dominate among harmful factors present at their work stands. Unexpectedly, they consider “noise” as the least harmful factor. This work conditions evaluation shows that all examined groups are aware of threats caused by harmful factors influencing on their health. Picture 5.10. presents answers concerning causes of accidents at specific work stands.



**Fig. 5.10.** Workers' answers concerning causes of accidents in last 5 years on specific work stands. Indicators: A – threats caused by moving material objects; B – threats connected with sharp elements; C – threats during transporting work; D – electrocution; E – mechanical injury; F – falls from height; G – burns; H – not obeying to work and safety regulations; I – incorrect work stand organization

According to supervising group of workers an accidents causes hierarchy is as follows: starting with “incorrect work stand organization”, “not obeying to work safety and hygiene regulations” and “electrocution”. Physical workers claim “incorrect work stand organization”, “not obeying to work safety and hygiene regulations” and “threats connected with injuries caused by loose and movable elements” as the main causes of accidents. Questions summing up the evaluation of material work environment concerned the link between work conditions and work quality. Physical workers' answers were diversified, the highest priority were given to the answer “work organization” and “friendly work environment”. Summing up this part of research we can say that although workers know the conditions they work at but do not fully realize the consequences for their health.

Technical supervision workers and administrative workers notice that works architecture is not adjusted to the needs of work process. Necessity to leave the works building especially in bad weather can be a cause of getting ill. Moreover physical workers mention that nervous system overload and stress can be the cause of health condition deterioration. Their answers show their necessity of creating friendly work conditions. Workers often complain on work monotony and necessity to work in constrained position. What is interesting, only workers with higher education are fully aware and sure that work conditions have an influence on their health. It is difficult to determine if their answers are result of their knowledge or with misinterpretation of this situation. Opinions concerning work organization and its influence on work quality and health is

also very interesting, both physical workers and technical supervision workers are not decided about significance of this factor.

## **Recapitulation**

Summing up the first part of research concerning social work conditions conducted in selected production unit in Opole province we can conclude that relations between employees working at parallel work stands are good. Evaluation of atmosphere at work towards employees working lower in company hierarchy is also very good; the proof can be proportion between positive and negative answers. Very often workers positively evaluate their supervisors and direct superiors. Maximum number of answers (over 140%) in three examined groups of unqualified workers, fitters, operators and physical workers is another example of this fact. The number of negative answers did not cross 95%. Also evaluation of works' social functions was very high.

Presented results of next researches did not confirm common opinion about bad social work conditions in production units functioning within market economy. We should put emphasis on fact that creating proper interpersonal relations and friendly atmosphere based on cooperation between workers and groups of workers is extremely important. Properly selected managing team, educated and able to manage the workers, will be a great support for the employer to help liquidate any conflicts between workers and supervisors as well as among group of workers. Workers friendly work environment and especially proper interpersonal relations have crucial influence on motivation and work quality. On the ground of presented results concerning social work conditions we can say that employees working in production units in Opole province are satisfied with their work conditions.

A subjective evaluation of material work conditions done by production units workers shows also their awareness of threats and their influence on health condition. Moreover, they are capable of pointing at those work elements that have influence on work quality. Aware worker is a worker who will be able to demand for changes and improvements of work conditions and respecting his right to safe work and health protection.

## Chapter 6

# WORK SAFETY AND PROTECTION AS ELEMENTS OF STATE SOCIAL POLICY

### 6.1. Social policy strategy in the 90's of XX century

Social policy's subject matter is human, his needs and means to perform his work. The 90's of XX century is not only characterized by structural changes. This period is also characterized by a few trends related to state social policy. First trend was connected with:

- implementing new welfares (unemployment benefits, housing benefits and others);
- changes in social services system, that should be available for all citizens with financial difficulties (previously social services were available only for elderly and disabled citizens);
- implementing or improving the mechanisms of adjustment social allowances and wages;
- liberation of liquidation of administrative restrictions related with charity and self – help activities [39].

Second trend focused on problem of unemployment, not only on helping unemployed but also on helping the unemployed to become occupationally active again. The amendment to Labour Code from 1996 introduces new term “policy of rational employment” executed by government powers and local authorities [12]. This form of state policy is defined in article 65, act 5 of Polish Constitution (1997) as follows “Government implements a policy aiming at full and productive employment by executing programs helping to delimit unemployment as well as by organizing, supporting and counseling professional trainings, service work and support points”<sup>23</sup>.

The third trend; taking into account limited state's financial means; was supposed to adjust social programs according to new market economy. Executing of this trend differed for former socialist countries referred to following problems:

- providing social services not only by government;
- limiting government's commitment to satisfy population's needs;
- limiting or ceasing of social activities in working places;

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<sup>23</sup> Polish Constitution, VI edition, Agencja Wydawnicza MZ, Warszawa 2008, p.18. [121].

- rationalization of social security systems (separating security funds from national budget; changing retirement age);
- limiting pension privileges in chosen professions;
- necessity to execute reforms related to pension and retirement system;
- necessity to execute reforms related to health care system [39].

### **6.1.1.Social policy subject of interest**

Social policy is “scientific discipline examining social and economic problems connected with activities aiming at satisfying human needs, it recognizes regularities and dependencies present in executing this part of satisfying needs and any other mutual economic and social implications”<sup>24</sup>.

Subject range of social policy includes needs that have to be satisfied in specific period of society’s development [37]. Current list includes such needs as:

- performing work according to acquired qualifications,
- satisfying wages,
- safe and hygienic work conditions,
- social insurance,
- medical care,
- proper living conditions,
- possibility to rest in free time.

Health protection is a part of work protection and a basic element of social insurance of the population. Health protection concept was created and developed in Europe for almost two centuries. Eventually, in 50’s of XX century the bond between state social policy (especially its health protection policy) with state economic policy has been established [26].

A general assumption of health protection policy in social aspect is limiting health inequalities and warranty of equal health protection. Satisfying population’ needs; particularly the occupationally active par of it, requires specific actions in the area of work hygiene that determines safe work conditions. Thus, work safety is a key problem for both employers and employees.

Employees’ work protection requires to recognize work characteristics and work conditions that allow to determine prevention actions that can be taken in dependence to kind and level of exposure to risk at work [37]. Occupational risks depend on industry branch, production profile and technical condition of machines and devices [4]. In extremely risky work conditions, the employer is obliged to implement health monitoring examinations and to educate the employees in the area of health protection and limitation risks connected with work at specific positions [77].

To protect employees’ health, according to Labour Code, a regular medical examinations such as preliminary, periodic and preventing health examinations

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<sup>24</sup> J. Kroszel, Podstawy polityki społecznej w gospodarce rynkowej, Opole 1994, p.22, [37].



should be conducted. Industrial medical services and work health clinics are supported in the scientific area by governmental institutions such as Institute of Occupational Medicine or Central Institute for Labour Protection.

One of the tasks executed by health protection policy is enabling the rehabilitation process to employees who became a victims of accidents at work or occupational diseases. Proper rehabilitation that enables them to come back to their profession does not only concerns employees and their families, but also state social policy that created adequate social insurance system.

Work conditions are the main cause of working population' health problems. Thus, work protection system is crucial. Although it does not have unequivocal definition – it certainly is superior to technical and organizational work conditions, hygiene and legal work protection, which aims to protect employee's health, life and ability to perform work tasks [29]. Ability to work is defined as organism' ability depending on age, gender, work conditions and employee's qualifications [80].

Extended meaning of legal work protection includes the whole range of legal norms beneficent for the worker; not only those related to health and life protection. Work protection norms include:

1. elementary work protection referring to workers in general,
2. special work protection referring to young workers and women (and their children).

Therefore current legislation of work protection consists of number of legal norms, that protect the worker from an extensive economical exploitation connected with their work as well as protecting him from physical and psychical health loss and life loss caused by unfavorable work conditions [11]. Legal norms according to this meaning refer to such issues as:

- safety and hygiene requirements in work plants (organizational and technical work conditions),
- results of not fulfilled safety and hygiene requirements,
- organization and procedures of work conditions supervision

Moreover, labour code regulates issues of work contracts (taking up the work and renunciation), wages, work safety and hygiene, time off and workers' and their families support in case of their inability to work of illness [75].

Definition of work safety and hygiene according to Polish Norms is [...]”status of work organization and conditions and workers' behaviors assuring required level of life and health protection against threats present in work environment”<sup>25</sup>.

Work safety and protection in Poland are regulated by acts, technical norms and amendments as well as by work regulations. Also Labour Code defines rights and obligations of employers and employees [38]. Labour Code sees work safety and hygiene as:

- “elementary rules of labour law,

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<sup>25</sup> PN-N-18001: 1999, Work safety and hygiene managing system – requirements, p.4. [133]

- rights and obligations of employers and employees,
- responsibilities of employers and employees<sup>26</sup>.

During system transformation period in Poland many changes, regulations and requirements into Labour Code have been implemented.

## **6.2. Work safety and protection in legal system in the beginnings of transformation period**

The following subsection presents major changes introduced into work safety legal regulations between 1989 – 2009.

In the beginning of system transformation period the Constitution Act of the Republic of Poland (from 1976) was in force and following statements were included: “Work is a right, obligation and point of honor of every citizen (Art. 19); Polish citizens have right to work, which means the right to be employed and be paid adequately to amount of work and work quality (Art. 68); Workers have right to free time” (Art. 69) and “Workers have right to health protection and help in case of illness or inability to work” (Art.70)<sup>27</sup>.

It is said in the Constitution Act of the Republic of Poland from 2<sup>nd</sup> April 1997 that “The labor is under protection of the Republic of Poland. The State is supervising the conditions of work performance (Article 24). Everyone has a right to safe and healthy conditions of work performed (Article 66) and everyone has a right to health protection (Article 68)”<sup>28</sup>. The above statements mean that the employer has to provide the employee with such work conditions that are in compliance with labor code in force in Poland.

„Development of worker’s right to health protection and warranties related to it can be found mainly in Labour Code and regular acts”<sup>29</sup>. The Labour Code is superior and dominant in law system called labour law; it is a source for numerous work safety and hygiene executive acts [81]. Between 1989 – 2004 many new legal solutions have been implemented and modified in changed Labour Code articles<sup>30</sup>. In 1996 a crucial and radical amendment of Labour Code has been implemented; a range of tenth section „work health and safety” has been changed<sup>31</sup>.

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<sup>26</sup> T. Wyka, *Bezpieczeństwo i higiena pracy po nowelizacji prawa pracy*, Vademecum pracodawcy i pracownika 23, Wyd. Difin, Warszawa 1999, p.16. [85]

<sup>27</sup> Constitution Act of the Republic of Poland enacted by Parliament on 22.07. 1952 with changes declared in „chairman People’s State Council declaration from 16th 1976, (Dz. U. nr 7, poz.36 z dnia 21 lutego 1976 r.). [119]

<sup>28</sup> Constitution Act of the Republic of Poland from 2.04.1997 r. Dz.U. nr 78, poz. 483.[120]

<sup>29</sup> T. Wyka, *Bezpieczeństwo i higiena pracy po nowelizacji prawa pracy*, Vademecum pracodawcy i pracownika 23, Wyd. Difin, Warszawa 1999, p.16. [85]

<sup>30</sup> Grounds for implemented changes was Act from 26th June 1974. Labour Code, Dz. U. Nr 24, poz.141]. [122]

<sup>31</sup> Labour Code amendment from 2<sup>nd</sup> February 1996 r. (Dz. U. nr 24 poz.110). [129]

Main cause for these changes was a necessity to adjust legal system to current situation such as new rules of work plants functioning in market economy and implanting changes according to MOP Polish Convention standards<sup>32</sup>. The other reason was adjusting to European Union guidelines 89/301/EWG related to workers' right to health protection.

Health and safety service, health and safety commission and health and safety rules terms have been added to chapter of the 10<sup>th</sup> section next to Primary duties of the employer, Employee's rights and duties. Those changes caused the necessity to implement another changes in other sections of Labour Code – issues of responsibility for offences against workers' rights and some changes labour law [85].

1<sup>st</sup> January 2004 a novel of Labor Code came into force. It introduced many new regulations including the duties of the employer towards the employees. It's aim was to adopt the current provisions of the Labor Code to the Constitution of the Republic of Poland and European Community Law.

Particularly important is the extension of the regulations related to restriction of discrimination in employment as to age, disability, race, sexual orientation and religion. In order to achieve this, the concept of direct and indirect discrimination has been defined and related tasks of the employer aiming at counteracting to the discrimination were described [5].

### **6.3. Work safety and protection in legal system after Poland accessed European Union (2004)**

The next novelty of labor law was involved with the accession to the European Union and came into force on 1<sup>st</sup> May 2004 [130]. European Community requires the domestic legislation of each Member State to be adjusted to EU standards. The changes are related to:

1. automatic transformation of the 3<sup>rd</sup> consecutive work contract signed for specified time period to contract for unspecified time period;
2. new requirements related to occupational health and safety;
3. rules of employment of citizens of the Member States in Poland;
4. rules of employment of children under 16.

1. Provisions related to time limited work contracts in Poland were adjusted to Directive no 91/383 from 25<sup>th</sup> June 1991 on Time Regulated Contracts in reference to providing sufficient measures in order to support the improvements in occupational health and safety of the employees remaining on contracts for

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<sup>32</sup> Convents: nr 139 relating to occupational risk control and prevention against cancerogenic substances and factors; nr 148 relating to protection against occupational threats caused by pollution, noise and vibrations; nr 155 relating to work safety and environment and workers' health, nr 161 relating to medicine of work, nr 162 relating to asbestos as a threat; nr 167 relating to health and safety issues in building industry and nr 170 relating to work safety connected with chemical substances threats [85].

limited time period and in Directive no 99/70 from 28<sup>th</sup> June 1999 regarding the framework agreement related to contracts for limited time period.

2. Starting from 1<sup>st</sup> May the employers have to adopt new regulations regarding the labor protection from mutagenic factors and provisions relating to activities that are necessary to be taken in case of contact with biological hazardous agents. The consequence of these changes are the ordinances of Ministry of Public Health which are describing in details the conditions of hazardous agents monitoring such as carcinogenic, mutagenic and biological. The ordinances must be compliant with the EU Directives such as: Directive from 28<sup>th</sup> June 1990 (no 90/394) on employee protection from threats posed by carcinogenic agents in work environment and Directive from 29<sup>th</sup> April 1999 (no 99/38) extending the subject of the Directive no 90/393 of employee protection from the hazards involving mutagenic agents in work environment. As to the biological harmful agents the ordinances must be compliant to Directive from 26<sup>th</sup> November 1990 (no 90/679) on employees' protection from hazards involving exposure to biological agents in work environment.

3. According to Directive from 16 December 1996 (no 71/96) on employees delegation on the basis of freedom of service each EU Member State must specify to which employment conditions will the regulations in force on its territory apply. Thus, in chapter IIa of the Labor Code the work relations of employees delegated to work in Poland from EU Member States to which polish labor law apply were specified.

4. One of the new solutions introduced to the Labor Code is the provision specifying the conditions in which children under 16 may work. It is compliant with the Directive no 94/33 from 22 June 1994 on adolescent protection which allows exceptions in domestic law from general prohibition of work for persons under 16. Thus, in polish legislation (Labor Code) it is allowed to employ children for entities operating cultural, artistic, sports or advertising activities.

The definition of labor law from the Labor Code (Article 9, §1) states that [...] "it is understood that the provisions of Labor Code and provisions of other statutory and regulation acts describing the rights and duties of employees and employers, as well as the resolutions of collective agreements, codes of practice and statutes describing rights and duties of employment parties"<sup>33</sup>.

Labour Code defines in detail obligations of both employer and employee in the area of work safety and hygiene<sup>34</sup>. The following regulations are currently in power.

Therefore, section ten "Work safety and hygiene" of chapter I 'Elementary obligations of the employer' of a Labour Code exposes the employer's responsibility for safety and hygiene conditions according to work safety and hygiene regulations. Following articles define employer's obligations in case of running business in the same place as well as employer's obligation in case of starting business who is re-

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<sup>33</sup> Labour Code, from 1st May 2004, Gazeta Prawna, Kodeksy nr 3/2004, Warszawa 2004, s.23. [130]

<sup>34</sup> S. Mac, J. Leowski, Bezpieczeństwo i higiena pracy, Warszawa 1998,s.8. [42]

sponsible to notify work and sanitary inspector about location, kind and range of this business.

Second chapter “Elementary obligations of an employee” of tenth section of Labour Code Art. 210 defines employee’s behavior rules in case of health threatening situations or situations exposing him to possibility of accidents. Art. 211 defines employees obligations in area of behaviors according to work safety and hygiene. Employee has to be familiar with health and safety rules, has to participate in proper trainings and perform his work according to acquired knowledge. Moreover he has to take care about machines condition, keep the work – stand clean and safe and use protection means according to their purpose. He also has to be subjected to preliminary and periodical medical examinations and follow doctors’ instructions [129].

In addition, in this section other chapters include provisions related to buildings and spaces of work, machinery and devices, agents and work processes posing a special threat to life and health. The last issue has been described in details in the rest of the chapter and other chapters are related to health protection, accidents at work, occupational diseases and related employee trainings, proper technical and organizational measures in this matter.

Mentioned above four changes in Labour Code implemented to labour law did not have a revolutionary character but caused many problems and necessity of implementing further corrections in following years. Another meaningful changes, not just Code’s modifications; took place in 2008 – 2009. First ones, implemented in January 2009 referred to further adjusting the Code to European Union regulations in the area of equal chances, work safety and hygiene as well as employer’s obligation in case of health threatening work conditions. Another changes referred to changed definition of “occupational disease” term, possibilities of claiming it, post – accident documentation as well as assigning a person responsible for workers in case of fire and evacuation [125; 126].

### **6.3.1. Work safety managing system**

Implementing PN – N – 18004 in year 2001 closed a certain stage in adjusting polish work safety norms to European Union regulations. Norm entitled ‘Work safety and hygiene managing systems’ was created to help in implanting and organizing efforts to improve work safety in organizations [133].

Work safety and hygiene managing is choosing proper methods and rules to achieve adequate safety condition while work performance [54]. Thus, managing process is to organize and to systematize the actions related to work protection in production works. This system bonds administrative actions, company management’s and each worker’s commitment to maintain and improve the work safety.

Work safety and hygiene managing system is implemented as a part of work safety policy executed by company’s management and includes introduc-

ing safety standards (both program and physical) and procedures in case of safety violations.

Many technical and organizational elements influence work safety according to Polish Norms:

- technological process that eliminates or delimits harmful, dangerous or strenuous factors;
- order of work activities and technical handling;
- maintenance of machines and devices;
- location of machines and devices around the production area;
- production area adjusted to work process requirements;
- work stands organisation;
- initial and semi-finished goods;
- ways of preserving and transport of materials, products and waste;
- workers' protection means against harmful and dangerous factors;
- safe behavior procedures and its control;
- group and individual means used against fires and explosions [131;132].

Thus, work safety management is a group of managing regulations that define and implement safety policy in work stands. It is connected with reasonable protection planning to find a compromise between financial input into implementing safety rules and production quality. Implementing those mechanisms is suppose to achieve expected safety level and protect company's business against possible harms. "A harm" according to Polish Norms relate to worker's health loss, product or materials damage, financial loss or causing threat to natural environment. Different measures have to be taken to compensate loss; rehabilitation, medical help and covering costs of damaged goods [134;135].

Implementing safety managing system is suppose to make all level workers to behave according to safety rules to protect their health, life and prevent accidents as well as to make them committed to apply safe work rules [41]. Moreover, each worker should know his duties connected with safety rules at specific work positions.

Therefore, the aim of implementing system into companies is to secure safety. Monitoring the safety condition, procedures and methods verification, inspections should be a means used to maintain it. Safety audit is an objective measure that valuates the quality of implemented safety managing system. It helps to determine strong and weak points of the company, to check if system is realized properly and if it meets all the requirements. Sometimes the evaluation of financial costs to implement safety managing system turns out to be not affordable for the company owner, this blocks the improvement process within the company [54].

Work safety managing system not only defines kind of harmful factors present in specific production environment but also informs about occupational risk caused by those threats and ways to prevent their influence. Occupational risk evaluation is crucial; it shows the necessity to adjust proper safety means to specific work conditions.

Therefore, work safety management is a tool for adequate managing of work safety. Typical procedures present in work safety managing system are:

- work safety and hygiene trainings,
- workers' medical care,
- keeping records and analyzing accidents and risky events at the workplace,
- work safety and hygiene campaigns,
- meetings and discussions related with safety issues,
- individual protection means,
- dangerous works
- work proces observation,
- work safety internal audits,
- risk assessment [34].

Properly functioning system influences on improved company's economic situation through eliminating potentially threatening events, through limiting occupational risk and more effective loss managing such as workers' health.

In various companies, the most common two groups of standards connected with workers' protection are work safety standards (such as norms and recommendations preventing the strenuous factors to affect the worker psychologically and physically) and ergonomic standards (aiming at decreasing work strenuousness and comfort definition) [41].

System secures work and hygiene's safety and guarantees constant improvement in this area [54]. Work safety and hygiene system does not only concern preventing from occupational diseases and physical injuries, it concerns the whole range of events that could be potentially unfavorable for the company. To achieve production goals, the employers have to find such organizational solutions to both, succeed in their business and to protect human health and the natural environment.

## **Recapitulation**

System transformation process in Poland, after rejecting in 1989 former political system, required to implement a parliamentary democracy and market economy. This kind of economy is based on privatization processes and its financial nature. Its base is market mechanism where all the economic decisions depend on economic calculus [45], its dynamics is shaped by market forces – as free as possible in creating prices and wages. However, as we know, the market and its dynamics cannot be the only indicator of social life. That is why system changes determined not only political and economic transition but also deep social changes. Uncertainty of employment and lack of social security made state social policy to deal with serious issues and forced it to implement new forms of acting. The situation required forces to mitigate the results of those

serious economic changes. The government and its social policy should take this part.

The passive social policy required implementing changes in new social and economic conditions; those changes were supposed to meet the new social expectations resulting from both economic changes and occurring structural unemployment. A necessity to adjust a legal system, labour law regulations and social policy strategy came out [57]. The changes referred to social benefits system and social insurance system. New solutions to decrease unemployment level have been implemented, especially towards occupational activation of long term unemployed citizens. Adjusting the social policy to the new economic situation also demanded crucial changes in social insurance and retirement system and need for preparation health care system reform.

A difficult social situation demanded changes in social policy and caused many legal improvements to take care of unemployed society members with unfulfilled existential needs. The priority of social services was to fight the employment phenomena and to make unemployed professionally active.

First legal regulations related with changes in work conditions and Labour Code changes and improvements implemented into labour law. First transformation period finishes with resolving Constitution Act of the Republic of Poland in 1997. Period of preparation to access European Union was followed by further changes in polish labour law system adjusting to European Union directives. Thus, the transformation period advanced introducing positive changes and made up for arrears in work protection system. Those intensive labour law changes made the employers to learn and implement ISO norms as well as work safety managing system. The subject matter of this dissertation will be to analyze the effects of those changes.



## SUMMARY

Work environment characteristics and threats present at particular work stands are determined by kind of production, technology in various industry branches and work organization system. Each work environment has its factors potentially threatening workers' health and exposing them to risk. Thus, determining levels of harmful factors intensity is an important criteria of work conditions estimation. Moreover, material work environment factors influence on level of necessary physical effort to perform work tasks and work strenuousness, which as a consequence influences on financial income and product quality.

Market economy requires more efficient human resources management, that improves a quality of social work conditions. Workers – friendly social work environment plays a very important role; it influences worker's attitude towards work and gives energy to solve problems and deal with difficult situations. Taking into consideration various work aspects we can not neglect the importance of social work conditions.

Process of transforming Polish economy into social market economy was constituted with a few periods characterized by different levels of intensity in the area of work conditions harmful factors. First period showed an increasing tendency of threats present at various work stands. Undoubtedly it was a result of system transformation. Decrease of employment, changes in managing systems, crating new economic units and privatization processes influenced on inversion tendencies in work organization confirm this statement. It also shows that in short period of time, a work protection system have been modernized which influenced work safety level.

Workers employed in different industry branches are threatened with health loss depending on kind of production and present harmful factors causing occupational diseases. Hearing system loss threat is present in most of various industry branches.

During the transformation period and especially in first decade up to year 1998 (in Opole province to 2000 year), the number of medically confirmed occupational diseases drastically increased. Harmful work conditions in 70's and the beginning of the 80's caused the increase of occupational diseases in the beginning of the 90's. A number of "general" occupational diseases stabilized in 2003 year in Opole province, comparing year 2003 with 2000 the number decreased of 50%.

Estimating the first phase of transformation in Opole province (to year 1994) we can observe a noticeably difficult work conditions connected with

harmful factors level especially in electro engineering and pulp and paper industry branches.

Next phase (till year 2003) showed constant increase in threatening work conditions in Opole province industry and stabilized in recent years. Another indicator of work safety level and work conditions are work accidents. Number of accident victims in economy oscillated between 4 – 3 thousands and to below 3 thousands.

Accident rate analysis during the transformation period shows that the number of accident victims in industry and economy has been systematically decreasing. It can indicate the improvement of work conditions in second decade of an analyzed period.

Between years 2003 – 2007 we can notice some stability in threatening conditions level; a decrease of number of workers threatened by harmful work conditions “in general”. A work performing strenuousness became an important issue in analyzed period, they show increasing tendency both in economy and industry of Opole province.

Material work conditions factors influence both on workers’ well being and physical and psychological efficiency. They also directly influence on work quality and indirectly on workers’ health, their children’s health and next generations’ health. Implementing work safety management system is a crucial condition to improve work safety and to protect workers’ health. Workers aware of this fact will not tolerate neglected work safety rules and will be able to demand introducing technical and organizational changes that could improve mentioned work conditions.

Government social policy consists of changes that need to be implemented to protect the society and creating means enabling society life with dignity. Presented actions and changes implemented in law system prove that government is aware of this problem and tries to solve it.

Implemented technological and organizational changes in work environment, industrial works’ modernization, improving medical services provided in selected works as well as in macro economic scale will result in:

- decrease of work accidents,
- decrease the number of sick leave,
- decrease of medical treatment costs
- decrease of the pensions number
- limited loss during production process

However; especially in industrial production; serious problems of technological nature exists. Technological processes analysis requires the participation of work environment engineering specialist, who could help to improve production processes. To improve work conditions and implement necessary changes, industrial works will also need certain means and economical support.

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## **WORK CONDITIONS IN ECONOMY AND INDUSTRY OF OPOLE PROVINCE**

### Dissertation abstract

Dissertation consists of six chapters that constitute continuation of research referring to work conditions in Opole province in transformation period and in following years.

The foundation of this dissertation was to prove the influence of government's social politics on economic situation and as a consequence – on working population's health condition through work conditions estimation. Government's social politics analysis was conducted in the area of work safety with reference to work conditions in Poland's transformation period. While undergoing crucial economic changes aiming at introducing market economy; grounds of its functioning – work conditions of workers employed mainly in Polish industry, became an important issue. Hence, presented dissertation analyses both data referring to work conditions in Poland as well as in Opole province, which constitutes the reflection of extensive processes and changes undergoing in Polish economy. Dissertation uses health threat indicators, work accidents as well as occupational diseases data.

The following chapters present:

- work conditions in Opole province economy and industry taking into consideration such consequences as threats;
- occupational diseases and work accidents;
- multidimensional estimation of noise as a dominant harmful factor;
- work safety level in estimation of selected professions;
- estimation of social and material work conditions made by workers employed in production area in Opole province;
- main aims of government's social politics and work safety changes undergoing during and after transformation period.

Dissertation shows that creating a proper work conditions is a very complex task. Its effectiveness depends on many factors; not only technical and technological but also on those connected with widely understood government's social politics. It seems like actions referring to increasing work safety level that are guaranteed by proper work safety politics effect in achieving expected goals such as work safety and efficiency.

## WARUNKI PRACY W GOSPODARCE I PRZEMYSŁE WOJEWÓDZTWA OPOLSKIEGO

### Streszczenie

W pracy przeanalizowano dane dotyczące warunków pracy w województwie opolskim, które stanowi swego rodzaju pryzmat odbijający szersze procesy i przemiany zachodzące w gospodarce polskiej. Zastosowano w niej mierniki zagrożenia zdrowia takie jak czynniki szkodliwe, zaistniałe wypadki przy pracy czy liczba orzeczeń chorób zawodowych.

Zagrożenia warunkami pracy i ich skutki w województwie opolskim stanowią treść rozdziału pierwszego. W oparciu o analizę statystyczną zagrożeń warunkami pracy populacji zatrudnionej w gospodarce i przemyśle pokazane zostały efekty określonej polityki społecznej państwa. Analiza rezultatów zachodzących zmian została zaprezentowana w odniesieniu do krytycznego roku 1989, przez okres transformacji, aż do roku 2003 poprzedzającego wstąpienie Polski do Unii Europejskiej.

Rozdział drugi pokazuje choroby zawodowe jako skutek zagrożeń występujących w środowisku pracy oraz statystyczną analizę wypadków przy pracy w gospodarce i przemyśle województwa opolskiego.

Rozdział trzeci poświęcony został problematyce zagrożenia hałasem. Nakreślono negatywny wpływ tego czynnika na zdrowie, szczególnie populacji czynnej zawodowo oraz konsekwencje w postaci chorób zawodowych jako efektu działania hałasu na narząd słuchu. Przedstawiono wyniki badań sondażowych przeprowadzonych w środowisku młodzieży gimnazjum i szkoły podstawowej dotyczące poziomu wiedzy na temat źródeł hałasu i świadomości zagrożenia zdrowia ze strony tego czynnika.

W czwartym rozdziale przedstawiono ocenę warunków pracy dokonaną przez przedstawicieli wybranych grup zawodowych. Na tle zawodów takich jak personel medyczny i nauczyciele, pokazano pracowników zatrudnionych w handlu oraz w straży pożarnej. Celem tego przeglądu różnych stanowisk pracy było z jednej strony uzyskanie informacji o tym jak ankietowani widzą swoje warunki pracy, a z drugiej ocena warunków wykonywania pracy.

W piątym rozdziale przedstawiono wyniki subiektywnej oceny społecznych i materialnych warunków pracy dokonanej przez pracowników w kontekście zagrożeń występujących na stanowisku pracy i ich skutków dla zdrowia jednostki. Ocena prowadzona była w podmiotach gospodarczych o charakterze produkcyjnym i różnej wielkości zatrudnienia.

W rozdziale ostatnim przedstawiono kierunek wprowadzanych zmian w prawie pracy oraz drogę do unowocześnienia i aktualizacji przepisów kodeksu pracy. Pokazano zmiany w polityce społecznej państwa, które były następstwem wprowadzanych zmian systemowych po roku 1989.