

Analysis of Work Accidents in Selected Activities in Slovakia, Czech Republic and Austria

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Abstract – Nacrtak

The aim of this article was to analyze the development and rate of work accidents in the Slovak Republic (SR) and to compare the results with the status in the Czech Republic and Austria. The occurrence of fatal accidents in the forestry of SR was also studied, as well as the share of these accidents in the main activities of agriculture, forestry and fishing. Information about accidents was stored in a database system. Data were entered and edited using an original form. The absolutely highest rate of fatal work injuries was recorded in Austria in the sector of agriculture, forestry and fishing. In SR, agriculture, forestry and fishing was evaluated as the second most hazardous industry with 12 accidents per 109 791 workers. The share of fatal work accidents in the forestry of SR in the total amount of fatal work accidents in SR reached more than 10% in the year: 2001, 2003, 2005 and 2006.

Keywords: work accidents, activities, forestry, cause, source

1. Introduction and issues – Uvod i problematika istraživanja

Due to social changes after 1989, business structure in various sectors of the national economy has changed considerably. Traditionally strong sectors such as engineering, heavy industry, mining and forestry were definitely weakened. At the same time, the structure of traditional business has also changed significantly so that small and medium enterprises were established and entrepreneurship was encouraged.

These changes also caused the collapse of the workers' safety and health at work – an effective care system until that time.

The aim of any successful company is to achieve maximum profit at minimum costs. As it is difficult to minimize the costs of components such as raw material needed for production, energy, labor and resources, everybody (companies, employers, self-employed persons and traders) often try to »save« costs at the expense of their own health or the health of their workers. They use machinery and equipment after their life expectancy, buy personal protective equipment of in-

ferior quality, fail to provide the mandatory breaks (mode of work and rest) and reconditioning stays, and last but not least, neglect regular preventive medical examinations, which can prevent illnesses or professional diseases. Therefore, the health and safety at work have now become one of the most important and most highly developed aspects of EU employment and social affairs.

The primary objective of the Community Strategy for the period 2007–2012 is to reduce the overall rate of workplace injuries by 25–27% in 2012 in EU by improving safety and health of workers, which will significantly contribute to the success of strategy for growth and employment. To achieve this ambitious goal, the Community proposes to:

- ⇒ ensure proper implementation of EU legislation,
- ⇒ support small and medium enterprises in implementing the existing legislation, adapt the legal framework to changes in the workplace and simplify it, especially with regard to small and medium enterprises,

- ⇒ support the development and implementation of national strategies,
- ⇒ support changes in the behavior of workers and health-focused approaches of employers, develop methods for identifying and evaluating new potential risks,
- ⇒ improve the monitoring of progress,
- ⇒ promote health and safety worldwide.

In order to improve workers safety and health at the national level, it is first necessary to establish connections between national prevention strategy and a common strategy of the European Union. The European Union is focused on objectives set for the strategy 2007–2012 on supporting small and medium enterprises. However, it is necessary to pay attention to these objectives especially at the state level.

In the forestry sector, changes in structure and number of employees in state enterprises were mainly influenced by the process of forest re-privatization and the fact that the main activities in state-owned enterprises were performed by contractors. A vast majority of employees left the state forests, and consequently the share of forestry activities performed by self-employed (freelancers) and small and medium enterprises significantly increased. These changes and changes in social and health insurance, as well as in health and safety legislation and registration of work injuries caused the decrease of accidents in this sector. In reality, the share of work accidents is significantly higher than indicated by official statistics and records. The issue of the trend of work accidents (2000–2007) and occupational diseases (2000–2010) in Slovakian forestry was comprehensively assessed by Suchomel et al. (2008) and Suchomel et al. (2011). In connection with the development of biomass use for energy purposes, new occupational diseases occur in forest management. Suchomel and Belanová (2012) found interesting results by analyzing the selected risks in the processing of forest biomass for energy purposes.

2. Methodology – *Materijal i metode*

This paper evaluates the development and rate of work accidents in Slovakia and compares the results with the status in Czech Republic and Austria. It also presents the occurrence of fatal accidents in the forestry of SR, as well as the share of these accidents in the main activities of agriculture, forestry and fishing. Data about fatal work accidents and work accidents in the Czech Republic and Austria have been sourced from the Report of Occupational Accidents in 2008 (latest available) issued by the organization EUROGIP

(EUROGIP 2009, 2010). The rate of fatalities in the Czech Republic was calculated based on 100 000 insured workers, and the rate of accidents with sick leave (SL) of more than 3 days based on 100 insured workers. In Austria, the rate of accidents was calculated based on the total number of workers, not only insured workers. Information about the number of accidents in Slovakia for 2008 was extracted from the data of the National Labor Inspectorate (Backstuberová 2010). For purposes of calculating the rate of fatalities, data on the number of workers in various sectors, available at the website of the Statistical Office of the Slovak Republic (www.statistics.sk), were used.

The main activities of NACE Rev. 2 are as follows:

- A Agriculture, forestry and fishing;
- B Mining and quarrying;
- C Manufacturing;
- D Electricity, gas, steam and air conditioning supply;
- E Water supply, sewerage, waste management and remediation activities;
- F Construction;
- G Wholesale and retail trade; repair of motor vehicles and motorcycles;
- H Accommodation and food service activities;
- I Transportation and storage;
- J Information and communication;
- K Financial and insurance activities;
- L Real estate activities;
- M Professional, scientific and technical activities;
- N Administrative and support service activities;
- O Public administration and defense; compulsory social security;
- P Education;
- Q Human health and social work activities;
- R Arts, entertainment and recreation;
- S Other service activities;
- T Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use;
- U Activities of extraterritorial organizations and bodies.

The analysis of fatal accidents in the forestry of SR was prepared based on data (years 2000–2011) obtained from the National Labor Inspectorate. Data about accidents were stored in a database system. Data were entered and edited using an original form. The evaluation criteria in the database were the information about accidents in accordance with the ESAW (European Statistics on Accidents at Work) and information needed for a detailed analysis of causes and sources of fatal work accidents.

3. Results – Rezultati

Fig. 1 graphically shows the comparison of the number of accidents in Slovakia, Czech Republic and Austria. The frequency of accidents with SL of more than 3 days in Slovakia has a downward trend until 2004. After this year, there is a modest increase in the number of accidents until 2008, when accidents begin to decrease. The incidence of fatal work accidents is fluctuating. The trend of the fatal work accidents (FWA) in SR is almost the same as FWA in Austria. The development of work accidents (SL more than 3 days) in the Czech Republic in this period has a downward trend. The incidence of fatal work accidents in 2006 also falls, but in 2007 there is an evident increase of the number of accidents. This fact is confirmed by the calculated rate of workplace accidents. Incidental trend in Austria is rather unstable. In the last reporting year (2008), the number of accidents with SL more than 3 days increased, as well as the number of fatal accidents.

The rate of work accidents in various industrial sectors of the selected countries is shown in Fig. 2. The absolutely highest rate of fatal work injuries was recorded in Austria in the sector of agriculture, forestry and fishing. In this sector, the maximum frequency of

fatal accidents was recorded in 2008 with 63 deaths per 100 000 employees. Transportation and storage is the second sector with the highest risk of fatal accidents in this country and the sector of construction is the third. Based on the calculated rate of FWA in Slovakia, it can be concluded that the highest risk was recorded in the sector of water supply, sewerage, waste management and remediation activities. The sector of agriculture, forestry and fishing is ranked second with 12 accidents per 109 791 workers, while the sector of construction is again third. In the Czech Republic, construction has been assessed as the sector with the highest risk of fatal work accidents, and then followed by mining and quarrying, water supply, treatment and discharge of waste water, waste management and remediation activities. The sector of agriculture, forestry and fishing, with FWA of 15 per 4 313 employees, is ranked fourth.

The rate of accidents with SL of more than 3 days per 100 employees was clearly highest in Austria in the sector of mining and quarrying (12.66), followed by agriculture, forestry and fishing (9.58), and the sector of construction, where the injury rate was 9.34. In the Czech Republic, the highest level of risk with SL of more than 3 days (2.98) was found in the sector of

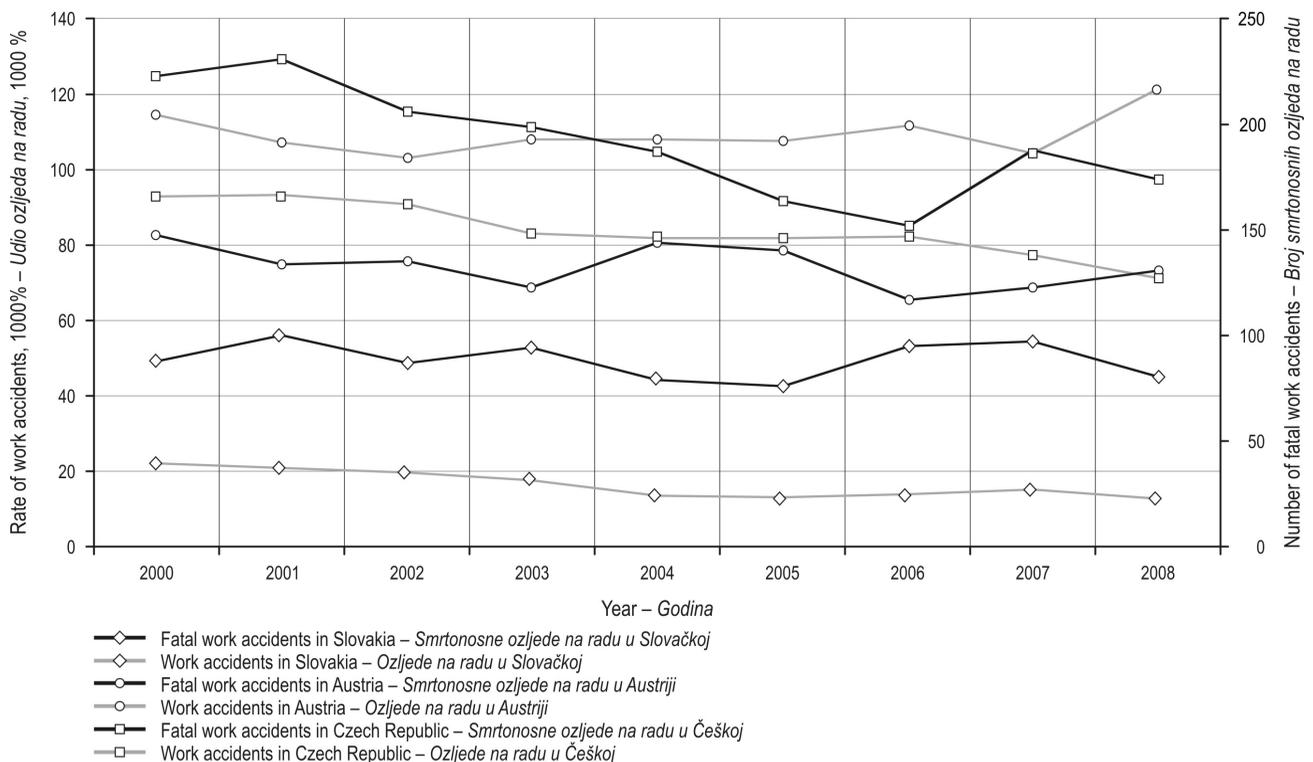


Fig. 1 Trend of work accidents in selected countries

Slika 1. Ozljeđe na radu u Slovačkoj, Češkoj i Austriji

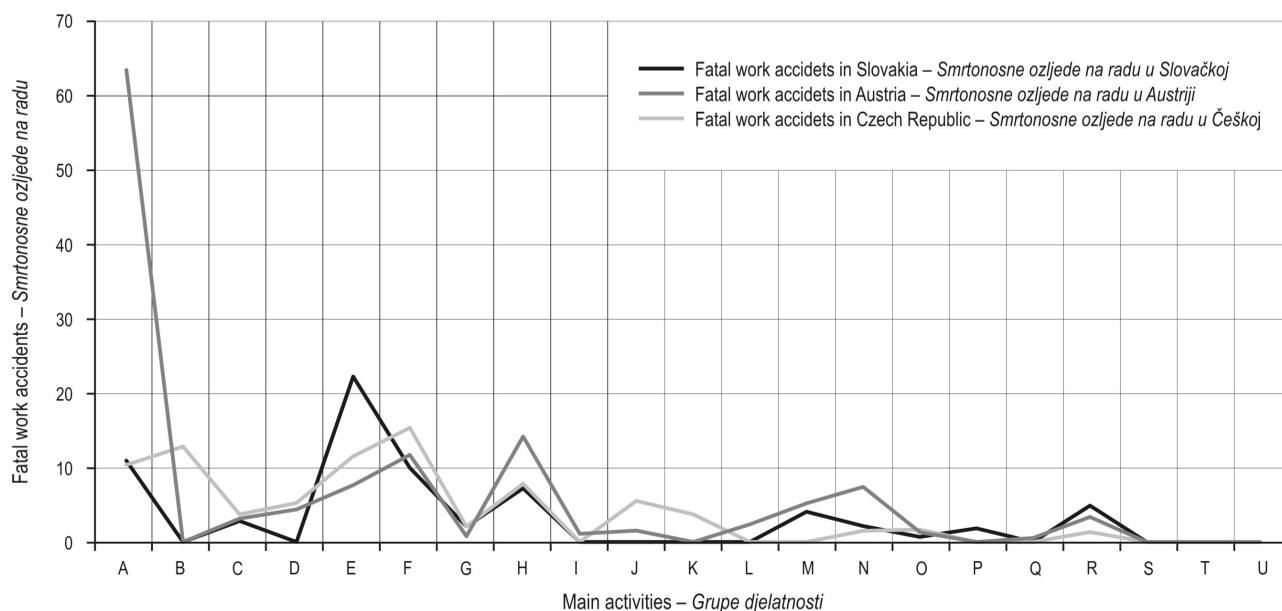


Fig. 2 The rate of fatal accidents per 100 000 workers

Slika 2. Smrtonosne ozljede na radu (uzorak od 100 000 radnika) prema skupinama djelatnosti

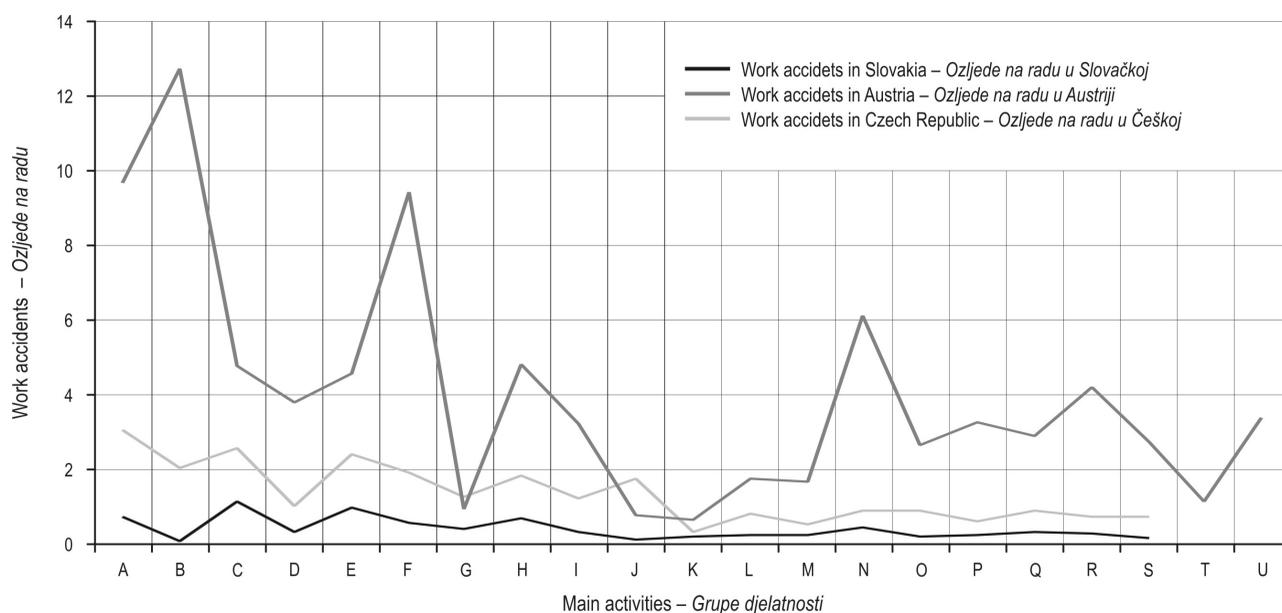


Fig. 3 The rate of work accidents per 100 workers

Slika 3. Ozljede na radu na 100 radnika, prema skupinama djelatnosti

agriculture, forestry and fishing, followed by manufacturing (2.51) and water supply, sewerage, waste management and remediation activities (2.35). In Slovakia, the highest calculated rate of accidents with SL of more than three days was recorded in the sector of manufacturing (1.09), followed by water supply, sewerage, waste management and remediation activities (0.89) and agriculture, forestry and fishing (0.67).

The survey of work accidents in different sectors is shown in the following two graphs. Fig. 4 shows that most accidents with SL of more than three days were recorded in industrial production in all the three countries. In the Czech Republic, 32 595 work accidents were recorded in this sector, which is still about 4 183 cases more than in Austria. In Slovakia, 5 782 work accidents with sick leave of three days and more was

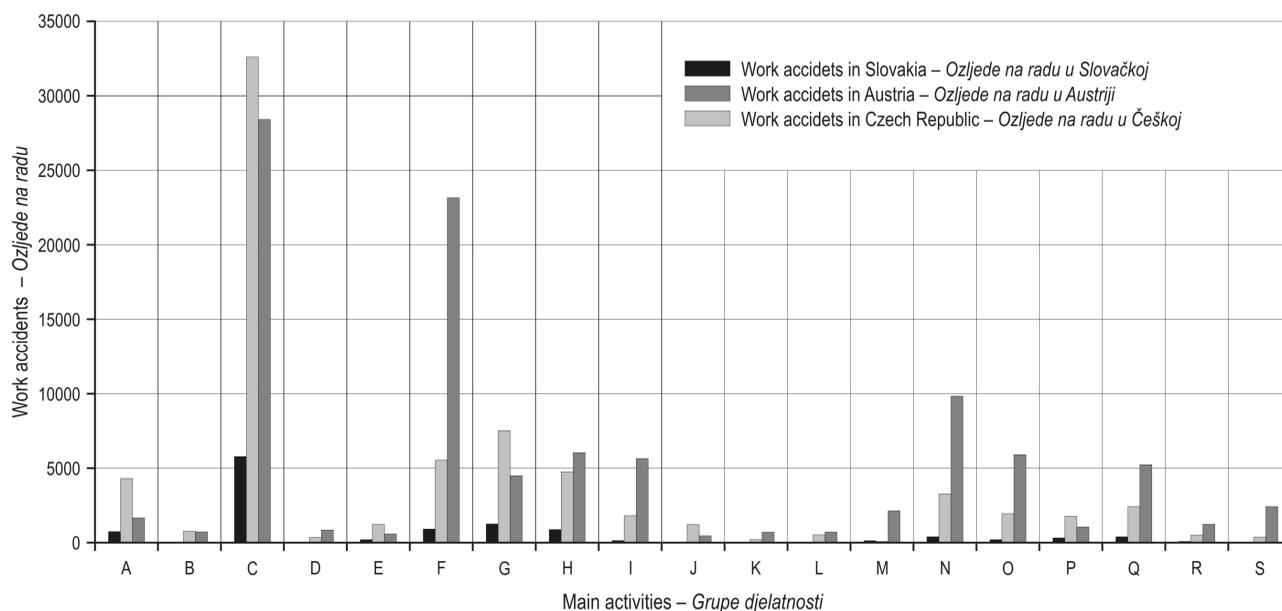


Fig. 4 Survey of work accidents with SL of more than 3 days in selected sectors

Slika 4. Bolovanja u trajanju duljem od tri dana (izazvana ozljedom na radu) u određenim skupinama djelatnosti

recorded in production. In SR and CR, wholesale and retail trade, repair of motor vehicles and motorcycles (SR – 1 256, CR – 7 523) were ranked second. In Austria, construction was ranked second with 23 161 cases. Construction accidents were ranked third with 916 cases in Slovakia and 5 537 in the Czech Republic. In Austria, the sector of administrative and support services was ranked third with 9 831 work accidents. Based on the evaluation of work accidents with SL of more than three days, the sector which includes forestry (agriculture, forestry and fishing) was ranked fifth in CR (4 313 cases) and Slovakia (739 cases), and in Austria, it was ranked twelfth with 1 663 cases.

The analysis of fatal accidents in two countries – Austria and Slovakia, showed that they prevailed in construction industry, as the total number of accidents in Austria and in SR was 29 and 18, respectively. In the Czech Republic, accidents prevailed in the manufacturing sector with 48 fatal work accidents. The second riskiest sectors were again construction in CR (46 FWA) and manufacturing in Austria and Slovakia with 19 and 15 work accidents, respectively. The third highest number of FWA was established in the Czech Republic and Austria in the sector of transport and storage (CR – 21 cases, Austria – 18 cases). In Slovakia, the third highest risk was assessed in the sector of agriculture, forestry and fishing, with 12 accidents. In the Czech Republic, 15 fatal work accidents were recorded (4th highest risk) in agriculture, forestry and fishing and in Austria 11 FWA (5th highest risk).

The number of fatal work accidents in Slovakia during the evaluated period ranged from 76 to 100 WA per year. The figure below shows the number of fatalities recorded in the forestry of SR. The share of fatal work accidents in the forestry of SR in the total amount of fatal work accidents in Slovakia reached more than 10% in the year: 2001, 2003, 2005 and 2006. Taking into consideration that the forestry sector goes along with agriculture and fishing, this share is not negligible. Most fatal work accidents were recorded in 2001, followed by a fluctuating further development of accidents. In 2007, there was a rapid decline from 10 cases per year to 4. Downward trend continued until 2011, when there was only one fatal work accident.

Fig. 7 presents the distribution of fatalities recorded in the forestry of SR, according to sources of work accidents in the period 2000–2011. Most fatal work accidents were caused by source group V – Material, loads, subjects (51%), source group V.a (including injuries caused by falls of soil, rocks, stones, and pieces of bulk material or by objects, products or equipment) caused 31% of FWA and source group V.b (including injuries caused by locomotion or otherwise manipulated objects, by sharp edges or by fragments) caused 20% of FWA. Source group I – Vehicles accounted for 22% of FWA. Source group III – Machinery – driving, ancillary and working accounted for a considerable share of 11%. Source group II – Hoists and elevators, lifting and transport equipment and source group IV – Work or traffic road places as sources of workers falls accounted for 5%

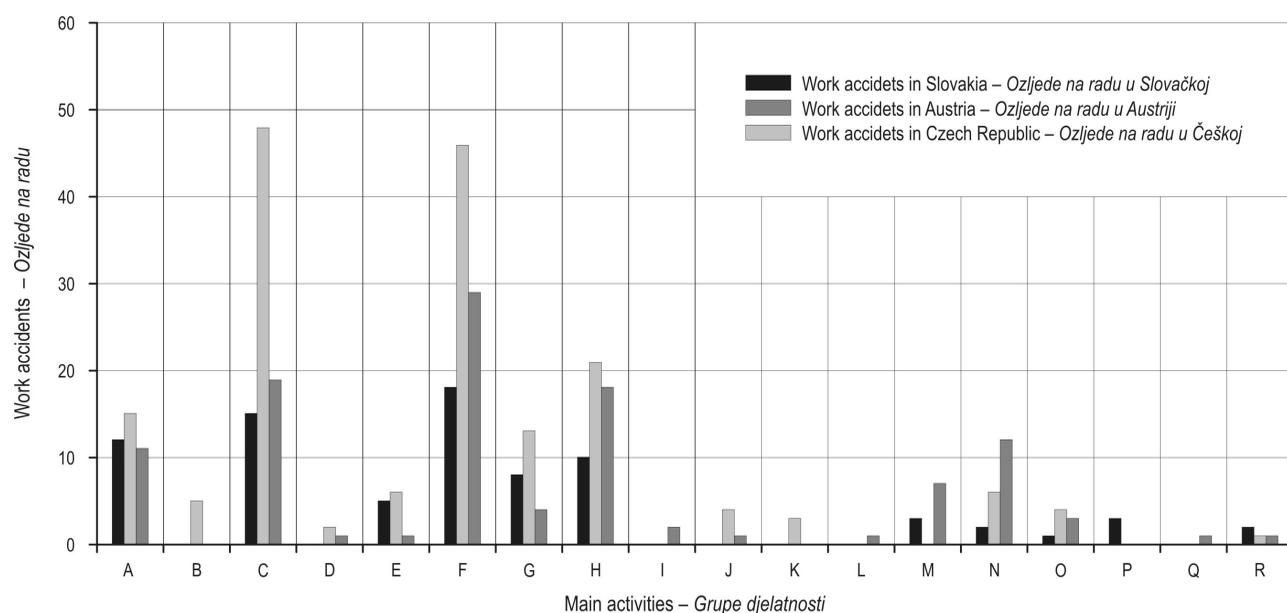


Fig. 5 Survey of fatal work accidents in selected sectors

Slika 5. Smrtonosne ozljede na radu po određenim skupinama djelatnosti

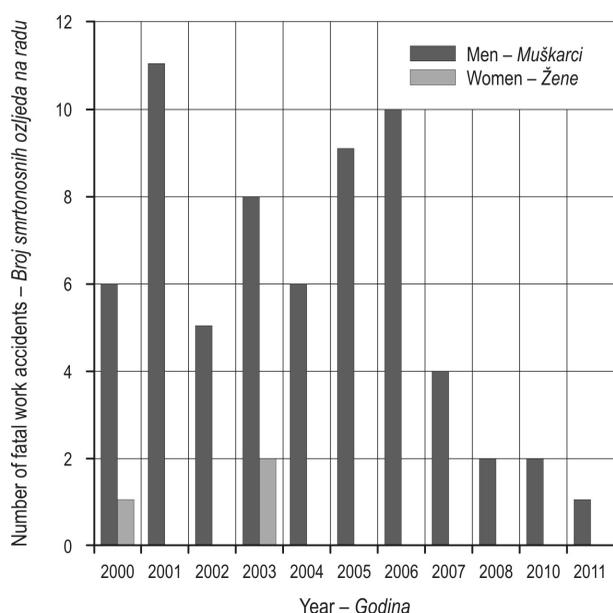


Fig. 6 Trend of fatal work accidents in forestry of SR

Slika 6. Smrtonosne ozljede na radu u slovačkom šumarstvu

of FWA. Source group VII – Industrial pollutants, hot substances and objects, fire and explosives, source group X – People, animals and natural forces and source group XI – Other sources accounted for 1.5%.

Fig. 8 presents the distribution of fatalities recorded in the forestry of SR, sorted by causes of accidents. Cause 8 (use of hazardous work practices or methods, including work without authorization, against orders,

prohibitions and directions, staying in hazard area) was determined in 42% of fatal work accidents. 20% of fatal work accidents were the result of cause 12 (the lack of individual prerequisites for proper job performance – for example lack of physical prowess, sensory deficiencies, negative personal qualities and immediate psycho-physiological statuses). Improper organization of work (cause 6) caused 11% of FWA, hazard by other persons, e.g. distraction at work, joking, arguing, other incorrect and dangerous actions (cause 11) prompted 9% of FWA. Failing to provide safe work conditions and lack of necessary skills (cause 7) resulted in 3% of fatal work accidents. 6% of FWA were caused by unidentified reasons. 1.5% of FWA were caused by wrong or bad status of accident source (cause 1), lack of protective equipment or inadequate protective equipment and security (cause 2), non-use or misuse of prescribed and assigned personal protective equipment (cause 10), hazard from animals and natural causes (cause 13).

4. Discussion – Rasprava

The aim of this article was to analyze the development and rate of work accidents in the Slovak Republic (SR) and to compare the results with the status in the Czech Republic and Austria, neighboring countries of Slovakia. The obtained results are similar to the results obtained by Croatian researchers. The number of fatalities among professional forest workers in Croatia increased by more than twice in the two 5-year

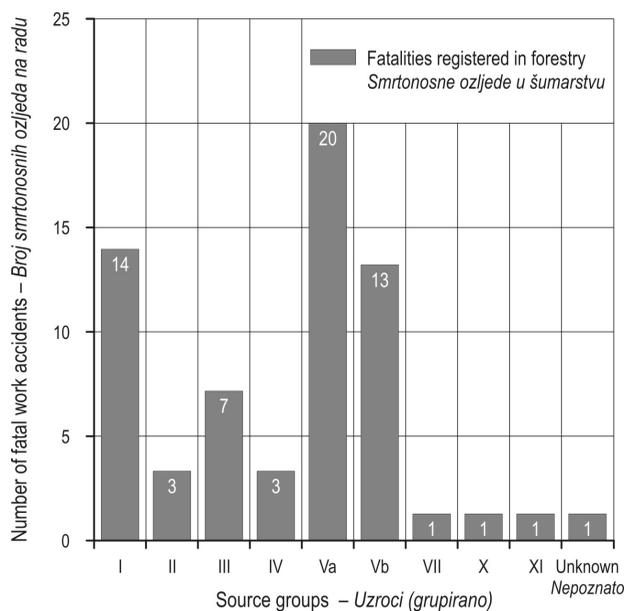


Fig. 7 Distribution of fatal work accidents in forestry of SR by source groups

Slika 7. Smrtonosne ozljede na radu u slovačkom šumarstvu po uzrocima ozljeda

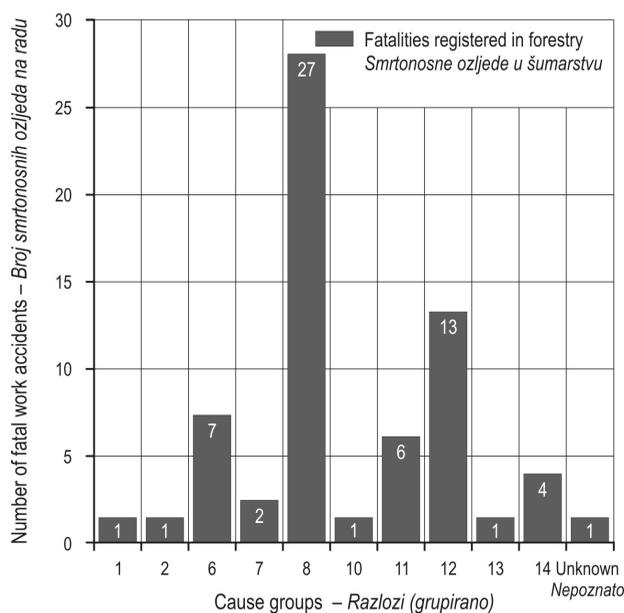


Fig. 8 Distribution of fatal work accidents in forestry of SR by causes of accidents

Slika 8. Smrtonosne ozljede na radu u slovačkom šumarstvu prema razlozima ozljeda

monitored periods (1995–1999, 2000–2004) (Klun and Medved 2007).

The absolutely highest rate of fatal work injuries was recorded in Austria in the sector of agriculture,

forestry and fishing. In this sector, the maximum frequency of fatal accidents was recorded in 2008 with 63 deaths per 100 000 employees. In Slovakia, the sector of agriculture, forestry and fishing is ranked second with 12 accidents per 109 791 workers.

According to the classification of business activities in the National Classification of Activities, agriculture, forestry and fishery together account for 3.43% of all injuries recorded in 2009, which places them in the lower part of the annual review. Comparing the number of injuries in Croatian forests with the number of employees in 2009, an exceptionally high ratio is obtained of 29.40 injuries per 1 000 employees, the highest index among the above said industry sectors (Martinić et al. 2011).

The use of hazardous work practices or methods, including work without authorization, against orders, prohibitions and directions, and staying in hazard area was determined in 42% of fatal work accidents recorded in the forestry of SR. Most fatal work accidents were caused by source group V – Material, loads, subjects (51%), source group V.a (including injuries caused by falls of soil, rocks, stones, and pieces of bulk material or by objects, products or equipment) caused 31% of FWA and source group V.b (including injuries caused by locomotion or otherwise manipulated objects, by sharp edges or by fragments) caused 20% of FWA.

In the structure of injury causes, two thirds of all injuries in Croatian forestry are caused by falls during movement, or by unsafe practices and disregard of work safety rules (Martinić and Radočaj 2006).

World and European trends in the field of work accidents and development of occupational diseases confirm changes. The change in the nature of work, level of technology and automation that affect the nature of work changes, has a decisive influence on these changes. Stress and lifestyle also have a decisive impact on the quality of life, especially on work, as confirmed by the findings of Martinić et al. (2006) and Landekić et al. (2011).

The number of fatalities is an important indicator of mastering the risks and shows the effectiveness as well as integrity of measures taken by individual countries in their attempts to provide safety in forest work (Klun and Medved 2007).

5. Conclusion – Zaključak

The results of the analysis of fatal work accidents can be used in prevention, control and organizational activities in forestry entities in Slovakia.

Data and information from the analysis can be applied in specifying risks for various harvesting opera-

tions – transport technologies, in assessing the risks of work accidents and quantifying their impact on the economy of individual companies and entities, and they can also be used for insurance purposes. Improving safety and health protection of workers can minimize the number of work accidents. It is especially important to focus attention on self-employed persons, who often underestimate the risk of work accidents in an effort to maximize the profit. It is important to use tools and equipment in accordance with health and safety requirements, as well effective personal protective equipment at work and to provide mandatory breaks. Working techniques of workers directly employed in forest operations play a key role in achieving a satisfactory degree of safety and efficiency in forestry work (Martinić et al. 2011). Applying these principles would be highly motivating and in contrast their breaching would be highly discouraging.

Acknowledgements – *Zahvala*

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Sažetak

Ozljede na radu u Slovačkoj, Češkoj i Austriji u pojedinim djelatnostima

Autori istražuju ozljede i smrtonosne ozljede na radu u Slovačkoj, Češkoj i Austriji. Podaci za Slovačku djelomice su dobiveni iz autorovih istraživanja, a djelomice iz baze podataka slovačkoga Državnoga zavoda za statistiku (*www.statistics.sk*), dok su podaci za Češku i Austriju preuzeti iz EUROGRIP-ova izvješća o ozljedama na radu za 2008. godinu. Ozljede i smrtonosne ozljede na radu, za sve tri zemlje u vremenu od 2000. do 2008. godine, prikazane su na slici 1. Broj smrtonosnih ozljeda na radu u Republici Češkoj izračunat je na temelju uzorka od 100 000 zdravstveno osiguranih radnika, a broj radnika koji su bili na bolovanju dužem od tri dana (zbog ozljede na radu) na temelju uzorka od 100 zdravstveno osiguranih radnika. Broj ozljeda na radu u Republici Austriji temelji se na ukupnom broju radnika (nevezano uz zdravstveno osiguranje). Broj ozljeda i smrtonosnih ozljeda na radu prema pojedinim skupinama zanimanja prikazan je na slikama 2 i 3. Skupine su zanimanja:

- A Poljoprivreda, šumarstvo i ribarstvo;
- B Rudarstvo i kamenolom;
- C Proizvodnja;
- D Klimatizacija i opskrba strujom, plinom i parom;
- E Opskrba vodom, upravljanje otpadom, sanacija i odvodnja;
- F Građevinske djelatnosti;
- G Maloprodaja i veleprodaja, servis motornih vozila;
- H Uslužne djelatnosti (smještaj i hrana);
- I Prijevoz i skladištenje roba;
- J IT;
- K Financije i osiguranje;
- L Djelatnosti vezane uz zemljišta i nekretnine;
- M Znanstvene i tehnološke djelatnosti;
- N Administrativne djelatnosti;
- O Javna administracija i obrana, socijalno osiguranje;
- P Obrazovanje;
- Q Zdravstvo i socijalni rad;
- R Umjetnost, zabava i sport;
- S Ostalo;
- T Djelatnosti kućanstava kao poslodavaca; nediferencirana roba i usluge kao djelatnosti kućanstava za vlastitu uporabu;
- U Djelatnosti izvanteritorijalnih organizacija i tijela.

Udjeli bolovanja radnika u trajanju duljem od tri dana (izazvana ozljedom na radu) te smrtonosne ozljede na radu po skupinama djelatnosti za sve tri zemlje prikazani su na slici 4 i 5. Smrtonosne ozljede na radu u šumarskoj djelatnosti Republike Slovačke prikazane su na slikama 6, 7 i 8. Slika 6 prikazuje broj smrtonosnih ozljeda na radu kod muškaraca i žena zabilježenih od 2000. do 2011. godine. Slika 7 prikazuje broj smrtonosnih ozljeda na radu ovisno o uzrocima ozljeda (I – upravljanje vozilima; II – upravljanje dizalicama, dizalima i podiznim uređajima i vozilima; III – upravljanje strojevima; IV – radovi na prometnicama; Va – odroni zemlje, kamenja i stijena, udari materijala, proizvoda ili opreme u proizvodnji; Vb – udari zbog rada strojeva, alata i opreme; VII – industrijsko onečišćenje, vruće tovari i predmeti, požari i eksplozije; X – ljudski i životinjski čimbenici, sile prirode; XI – ostalo). Slika 8 prikazuje broj smrtonosnih ozljeda na radu ovisno o razlozima ozljeda (1 – nepovoljan izvor ozljede; 2 – nepostojanje ili neprikladna zaštitna oprema za rad; 6 – pogrešna organizacija rada; 7 – nepridržavanje uputa o zaštiti na radu ili neobrazovano radno osoblje; 8 – opasni radni postupci ili metode, uključujući i rad bez odobrenja, protivno uputama i zabranama; 10 – nekorištenje ili pogrešno korištenje propisane i dodijeljene osobne zaštitne opreme; 11 – rastresenost, svađanje, šaljenje i slične radnje koje odvlače pozornost; 12 – nedostatak pojedinih predujeta za pravilno obavljanje poslova (u smislu općega zdravstvenoga stanja); 13 – životinje i prirodne sile).

Poboljšanje sigurnosti i zaštite na radu može smanjiti broj ozljeda te očuvati zdravlje radnika. Važno je upotrebljavati alat i opremu u skladu sa zdravstvenim i sigurnosnim zahtjevima te voditi računa o uporabi osobne zaštitne opreme. Radnike bi trebalo primjereno pozitivno poticati na pravilan i siguran rad, a one koji ne rade u skladu s uputama treba ukoriti i primjereno kazniti.

Ključne riječi: ozljede na radu, radne djelatnosti, šumarstvo, uzrok, razlog

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